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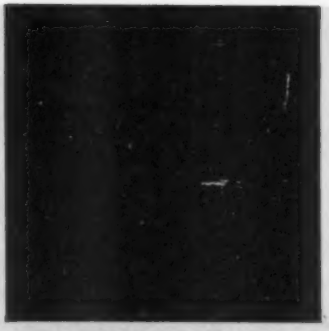

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General Information

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Intraoral Breath Pressure in Cerebral Palsy

• *James C. Hardy*

It is the thesis of this paper that some of the speech problems of children with cerebral palsy may be related significantly to their inability to produce sufficient intraoral breath pressure for speech sound production. This paper will present (a) the rationale in support of this thesis, (b) some techniques and concepts involved in evaluating the ability of such children to produce intraoral breath pressure, and (c) cases to illustrate the relevancy of the techniques discussed. The techniques for assessing ability to produce adequate intraoral breath pressure for speech in persons with cerebral palsy are complex, but it is believed that it is necessary to accomplish them in order to assess thoroughly the bases for the speech problems in that population.

Black (*2*) has shown that different intraoral breath pressures are associated with voiced and voiceless consonant sounds. He found voiced consonant sounds to be associated with significantly lower intraoral pressures than voiceless consonant sounds. Black's data also suggest that intraoral breath pressure is significantly higher for continuant than for plosive sounds except when these two types of speech elements occur in the middle of a spoken word. In such an occurrence there seems to be no significant difference between these classifications of sounds with respect to intraoral pressure.

While Black's data show that pressure differences exist in the oral cavity during the production of various speech elements, little is known regarding the minimum oral breath pressure requirements for speech production. Spriestersbach and Powers (*9*), reporting on a large body of data from cleft palate subjects, suggest that eight ounces per square inch of intraoral pressure appear to be the minimum amount necessary for satisfactory production of those consonant elements requiring relatively high breath pressure. Goddard (*5*) found that over 90 per cent of five-year-old boys and girls with normal articulation could achieve eight ounces or more of intraoral breath pressure as measured by an oral manometer. However, some of her speakers could impound only five ounces per square inch of breath pressure. While the data available to date on the minimal requirements for intraoral breath pressure are fragmentary, they suggest that wide individual differences among speakers may be expected. Thus, although research findings do not indicate clearly that an absolute minimum can be specified, at least at this time, it is clear that some amount of positive breath pressure is required for production of consonant sounds.

James C. Hardy (Ph.D., State University of Iowa, 1961) is Supervisor of Speech and Hearing Services, Hospital School for Severely Handicapped Children, State University of Iowa. This paper was presented before the American Academy for Cerebral Palsy October 6, 1960, at Pittsburgh, Pennsylvania.

The evaluation of velopharyngeal competency, as revealed by lateral head X rays, cinefluorography, oral versus nasal air-flow measurements, and intraoral breath pressure measurements, may be used to advantage in evaluating the potential ability of children with palatal insufficiency to articulate consonant sounds. Problems of nasality may be assumed to be largely secondary. This philosophy has been followed in developing techniques at the University Hospital School for Severely Handicapped Children, State University of Iowa, for assessing the ability of a child with cerebral palsy to produce intraoral breath pressure.

This point needs emphasis since this article will, in part, involve consideration of palatal efficiency and the effect of a malfunctioning palate in reducing a child's ability to produce intraoral breath pressure. It seems inevitable that in such a discussion of velopharyngeal closure a frequent assumption is made that the factor of primary importance is the acoustic coupling of the nasal cavity to the oral cavity and that the resulting abnormality of interest is that of nasal voice quality. It is re-emphasized that for the purposes of the present discussion there is *no interest* in assessing nasality problems or the cause of nasal voice quality. Present interest is in the patient's ability to create pressure within the mouth needed for generation of consonant sounds.

In the cleft palate population velopharyngeal incompetence is usually the main cause of the speaker's inability to impound oral pressure. However, in the case of the child with cerebral palsy, inability to generate oral breath pressure may be the result of one of, or a combination of, the following conditions: (a) His palate may be partially or wholly paralyzed and air thereby escapes into the nasal passages during speech attempts, precluding a pressure build-up in the mouth. (b) The child may not be able to generate oral pressure, or at least he may be unable to coordinate the generation of such pressures with articulatory movements, due to paretic involvement or weakness of the respiratory musculature. (c) He may not be able to impede the oral air stream with his paretic or weak articulators to the extent necessary to build up air pressure behind the tongue or lips.

The literature dealing with speech problems of individuals with cerebral palsy contains numerous references to their neuromuscular problems which affect speech production. Most frequently discussed are poor motility and incoordination of the musculators involved in respiration and in the control of the jaw, lips, and tongue. There are numerous descriptions of the effect of such abnormalities upon formation of resonance cavities, timing of articulatory movements, and creation of a controlled air stream for speech production. Certainly, such physiological problems are importantly related to speech problems in cerebral palsy. However, the ability of the patient with cerebral palsy to produce intraoral breath pressure as a physiological requirement for speech has not received extensive coverage in the literature. Yet it may well be that the patient's inability to produce such pressure during speech attempts is one of the main obstacles to adequate speech. Moreover, a diagnosis of his ability to produce oral breath pressure may give

precise information, otherwise unattainable, regarding one aspect of his physiological readiness for speech.

The assessment of the ability of a child with cerebral palsy to produce oral pressure may be difficult for two reasons: (a) It is difficult to analyze the effect of one specific musculature separately from that of another. (b) The potential for movement of any of the sets of muscles being discussed is quite variable from subject to subject and from moment to moment for a given subject. However, such a diagnosis is deemed necessary. This necessity is apparent from the report of Spriestersbach and Powers (*9*) that *not one* child with a cleft palate who demonstrated an inability to produce eight ounces per square inch of intraoral breath pressure had adequate articulation.

Palatal Malfunction

Attention will first be given to problems of velopharyngeal incompetency and techniques for assessing such incompetency in the population being discussed. Unfortunately, there are few group data available which give the incidence of velopharyngeal incompetency in children with cerebral palsy. Dawes' pioneering, systematic study (*3*), which was designed to assess such problems, reports that 30 (13%) of 225 children with cerebral palsy had velopharyngeal closure problems which were believed to be significantly related to their speech difficulties.

At the University Hospital School, evaluation of palatal efficiency of 41 children with cerebral palsy who have speech problems shows that 16 (39%) have velopharyngeal closure problems which are considered significant to their speech problems. The only explanation offered for the higher incidence in the latter group is the refined diagnosis made possible by the techniques to be described.

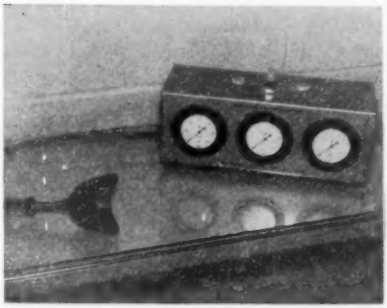

Figure 1. An oral manometer adapted with a mouth mask for use with children with paresis of the lip musculature.

The nature of palatal breakdown is so varied in this group of 16 children that group data lose meaning. For the purposes of this paper, the techniques used for assessment of velopharyngeal competency can best be made clear by describing the evaluation of certain children.

David M. (date of birth, April 9, 1949), was an athetoid, quadriplegic child, first suspected of having a palatal problem in September 1957. Lateral head X-ray films taken in June 1958 revealed no palatal closure during prolongation of vowels. No assessment of closure could be made by this technique during prolonged productions of an /s/ or any continuant consonant because David's involuntary head movements during speech productions precluded the taking of a clear lateral X-ray film. With an oral manometer, David could usually achieve pressures of only four to five ounces per square inch with his nostrils open. There were instances where the boy could achieve 11 and 12 ounces of pressure with his nostrils open. With his nostrils occluded he could achieve up to 11 and 12 ounces per square inch of pressure.

Figure 1 illustrates the adaption of

the oral manometer used for the children with cerebral palsy. Because many such children are unable to close their lips around the tube ordinarily employed with the manometer, the use of the mouth mask may be necessary.

Velopharyngeal incompetency is evaluated with an oral manometer by comparing the amount of pressure a subject is able to produce with his nostrils open with the pressure he can produce with his nostrils occluded. When the two pressures are used to form a ratio, the former over the latter, the ratio should equal one if there is adequate valving by the palate. David's pressure ratio usually did not equal one. However, as described above, there were times when his ratio did equal one. Clarification of just what was happening with respect to velopharyngeal activity was made possible through the use of cinefluorography.

A cinefluorographic film of David's palatal action taken in June 1959, during his attempts to produce isolated speech elements and during continuous speech, showed only two instances of velopharyngeal closure. The only explanation for these isolated instances of closure which seemed tenable was that they were in some way a type of random reflex behavior. During the rest of the speech sample the palate was essentially immobile. On the basis of this film it was concluded that David's infrequent productions of good oral pressure on the manometer were possible because of the random, unpredictable instances of palatal closure.

In August 1959 David had pharyngeal flap surgery. The results of that surgery are considered to be most satisfactory. The boy's oral manometer readings with his nostrils open now average 14.33 ounces per square inch, and his manometer ratio consistently equals one. When he left the University Hospital School for a summer vacation after nine months of postsurgery remedial speech work (June 1960), he had made excellent progress in improving his articulation. His speech is now judged to be intelligible, whereas prior to surgery it was usually unintelligible. This progress, which is described in detail by Hardy and others (7), attests to what speech progress a child with cerebral palsy may achieve once he can attain intraoral breath pressure. David was able to develop in nine months postsurgery articulatory skills which he had been unable to achieve previously in seven years of relatively consistent remedial speech work.

Mike P. (date of birth, October 10, 1954), who has the spastic quadriplegia type of cerebral palsy, manifests a second example of significant velopharyngeal incompetency. He was first examined at the University Hospital School in July 1956. His first entrance to the Hospital School was in January 1960 when he was four years, three months, of age. His speech was quite nasal and, for the most part, unintelligible. With his nostrils open Mike could achieve approximately two ounces of pressure per square inch of the oral manometer. With his nostrils occluded he could routinely achieve six ounces per square inch. This difference in pressures indicates that a palatal breakdown was present during this relatively static activity. Cinefluorography showed that Mike achieved velopharyngeal closure during isolated syllable production but not during connected speech.

Eddie G. (date of birth, December 12, 1948), who has moderately severe athetosis, persumably on the basis of kernicterus, presents a third example of velopharyngeal incompetency for speech production. Eddie has received remedial speech work in the University Hospital School since September 1954. He has made good progress in development of speech skills when one considers that he has (a) a moderate to severe bilateral high-frequency hearing loss and (b) mild to moderate paresis of the speech musculature. Palatal involvement was not considered one of his problems until it was noted that his acquisition of speech phonemes had plateaued very sharply after June 1959. A search for the reason for this deceleration of progress yielded very little information until March 1960.

Eddie could consistently achieve above 13 ounces of pressure per square inch on the manometer with his nostrils open. The difference between this pressure and that obtained with his nostrils occluded was insignificant. Eddie could occasionally speak quite well, and at such moments

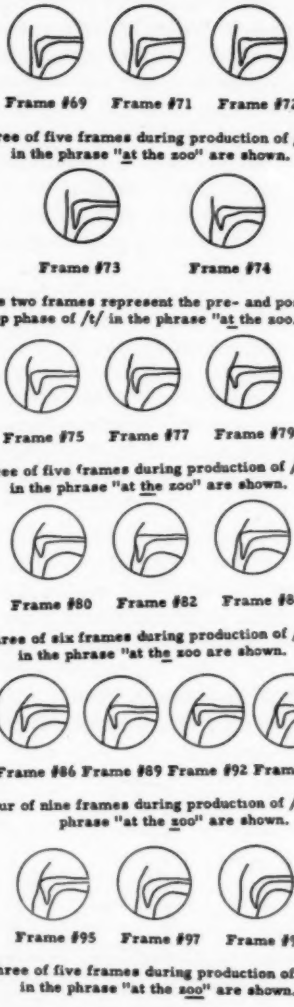
Frame #69 Frame #71 Frame #72
Three of five frames during production of /æ/ in the phrase "at the zoo" are shown.
Frame #73 Frame #74
The two frames represent the pre- and post-stop phase of /t/ in the phrase "at the zoo."
Frame #75 Frame #77 Frame #79
Three of five frames during production of /ð/ in the phrase "at the zoo" are shown.
Frame #80 Frame #82 Frame #84
Three of six frames during production of /ʌ/ in the phrase "at the zoo are shown.
Frame #86 Frame #89 Frame #92 Frame #94
Four of nine frames during production of /z/ in the phrase "at the zoo" are shown.
Frame #95 Frame #97 Frame #99
Three of five frames during production of /u/ in the phrase "at the zoo" are shown.

FIGURE 2. Tracings of selected cinefluorographic film frames of an 11-year-old athetoid boy showing velopharyngeal movement during running speech. Closure was not consistently attained during the production of consonants requiring high intraoral breath pressure.

he could even produce sibilants and fricatives. His speech was intelligible at such times. Usually, however, he could be understood only with some difficulty. Nasal emission of air was noted during much of his speech. Yet, cinefluorographic films of Eddie's palate during speech showed palatal activity which appeared to accomplish good velopharyngeal closure. However, a frame-by-frame tracing of his cinefluorographic film revealed that he did not achieve normal closure during speech.

Figure 2 shows tracings of selected frames of the cinefluorographic film during the boy's production of 'at the zoo' (/æt ɚʌ zu/).[1] The boy achieved no closure during the production of the vowel /æ/, consonant /t/, and consonant /ɚ/. On the vowel /ʌ/ following /ɚ/, the child achieved closure, but lost complete closure before beginning the production of the pressure consonant /z/. He achieved only slight and incomplete closure during /z/. He lost closure completely during the vowel /u/.

Still other tracings revealed that during the production of fricatives and sibilants Eddie achieved only partial closure or no closure where preliminary cinefluorographic research has suggested it was needed.[2] There were only two instances of closure associated with high pressure sounds such as occurred on /z/. On the basis of these tracings, the conclusion was reached that Eddie's incoordinated and inconsistent palatal function was significant to his present speech problems and that he probably could make no further progress in developing speech until this problem was remedied. Details of the management of both Mike's and Eddie's velopharyngeal closure problems are discussed elsewhere (7).

Three different types of velopharyngeal malfunction due to cerebral

[1]Despite his having had practice in speaking this phrase, Eddie's production of /t/, /ɚ/, and /z/ during the cinefluorographic procedure could be considered only approximations of these sounds.

[2]Information obtained from Kenneth Moll, Ph.D., Research Assistant Professor, Department of Otolaryngology and Maxillofacial Surgery and Department of Speech Pathology and Audiology, State University of Iowa, in conversation with the author.

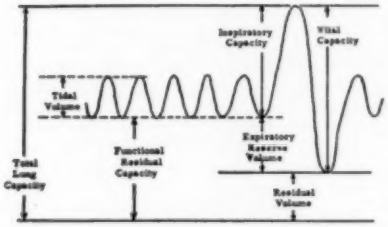

FIGURE 3. Nomenclature for the subdivisions of the lung volume (*8*).

palsy have been presented. One was the result of an almost totally paralyzed palate. The second was characterized by relatively adequate palatal action during one type of speech activity (repeated syllables), but relative immobility during continuous speech. The third palate appeared functional, but close examination showed incoordinated movements and incomplete closure during speech which undoubtedly precluded a build-up of intraoral breath pressure when it was usually needed. These examples demonstrate the need for a variety of techniques for assessing adequate palatal action in children with cerebral palsy. However, a diagnosis of significant palatal malfunction can be made with considerable confidence if a battery of such techniques is used.

RESPIRATORY MUSCULATURE WEAKNESS

Assessment of oral breath pressure problems in children with cerebral palsy which are caused by their inability to use their respiratory musculature is not as precise as assessment of palatal malfunction. In the discussion of Mike P. it was noted that he was able to generate only six ounces per square inch of pressure with the manometer when his nostrils were occluded. This performance of maximum pressure potential may be indicative of paresis or weakness of the respiratory musculature. Other children with cerebral palsy have been found to be able to generate only four ounces of pressure on a manometer. However, the significance of the manometer measures in this instance is not clear in view of certain dynamics of respiratory physiology and respiratory problems found associated with cerebral palsy. That is, in this instance these measures do not assess problems of pressure capability during any prolonged expiration but only maximum pressure producing potential at full lung volume. This is so because of the relationship of lung volume to the pressure producing potential of the human respiratory mechanism.

Lung Volumes. Figure 3 is a drawing designed to show selected partitions of the lung volume. The tidal volume represents an individual's usual breathing pattern which is dictated by oxygen needs of the body. The baseline of the tidal breathing pattern (resting lung volume) during rest breathing is the-

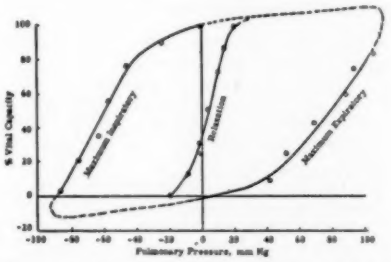

FIGURE 4. Diagram showing pressures which can be developed passively (relaxation pressure) or actively (maximum pressures) at different lung volumes (*4*). This diagram is reproduced with the permission of Wallace O. Fenn, Ph.D., and the School of Aviation Medicine, USAF Aerospace Medical Center (ATC), Brooks Air Force Base, Texas.

oretically where pressure within the lungs is equal to atmospheric pressure. Above the baseline (where lung volume is greater than resting lung volume) expiration is largely passive in any type of nonforced breathing. Below this line expiration *must* be forced by use of the expiratory musculature.

Study of lung volumes of children with cerebral palsy (*6*) has shown that their inspiratory capacities and expiratory reserves are, in general, reduced as compared to normal children's lung volumes. The expiratory reserve is by far the most reduced lung volume in the cerebral palsy population. Many of these children have *no* expiratory reserve at all. This finding suggests that, in general, their expiratory musculature does not function properly. The breakdown in function may be because their expiratory musculature is (a) weak, (b) paretic, (c) opposed involuntarily by the inspiratory musculature, or (d) affected by combinations of these three factors.

Relationship of Pressure Potential to Lung Volume. Figure 4 is a diagram showing the pressure producing capabilities of the human respiratory mechanism. Two types of pressure potentials are given, (a) relaxation and (b) maximum or active. The relaxation pressure is that created by the elastic recoil of the respiratory mechanism without active muscle effort. The maximum positive pressures are those which may be created by active contraction of the expiratory musculature. Both of these pressure curves are dependent upon the inflation of the lung.

Since capability to produce oral pressure above that created by relaxation of the inspiratory musculature depends upon expiratory musculature activity and lung volume, and since both of these factors, as well as respiratory control, seem to be deficient in many children with cerebral palsy, it would seem logical to infer that the most complete way to assess such children's potential for producing oral breath pressure by pulmonary activity is to obtain a pressure-volume graph such as shown in Figure 4 for each child. This type of work is currently in progress at the University Hospital School.

The writer anticipates that these curves will be vastly different from those of the physiologically normal child. Because of the previously mentioned factors leading to lack of expiratory ability, it seems likely that the child with cerebral palsy must have more complete inflation of his lungs to produce a given amount of pressure than physiologically normal children. Moreover, it would seem logical that as their lung volume is reduced, the pressure producing capacity of children with cerebral palsy will drop more sharply than that of physiologically normal children.

It is suggested, therefore, that the relatively static pressure producing potential for children with cerebral palsy as revealed by the manometric measures is only a fair indication of how their respiratory musculature produces pressure during speech since as they lose a given quantity of air during speech, their pressure producing potential may drop quite sharply. Moreover, instructions given to children using the manometer usually result in their blowing into it with their lungs maximally inflated. In such cases, the manometer measures would indicate only their maximum pressure producing potential. Such a measure would not indicate

their pressure producing potential when their lungs are less than maximally inflated, which is probably the situation during most of their speech attempts.

Hopefully, these a priori speculations will be substantiated or refuted by forthcoming data. Perhaps more efficient clinical evaluations of the ability of the child with cerebal palsy to generate oral pressure by respiratory activity will result from this research than is currently available.

Use of Articulators

A build-up of breath pressure within the mouth during speech production requires impeding the air stream within the mouth by the articulators. The release of a given obstruction to the air stream may, for example, result in the articulation of a bilabial consonant if that obstruction has been effected by lip closure. The air flow will be stopped completely during the stop phase of a plosive, and it will be diminished appreciably during production of a fricative. Upon the release of such an occlusion or restriction of the air stream, the air flow will increase. The patterns of air flow associated with the production of various speech elements has not been studied until recently (*1*).

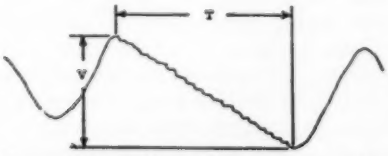

Figure 5. A drawing of a spirometric tracing of a subject repeating /CV/ syllables is shown. Time (T) progresses from left to right and volume of expired air per syllable is computed by dividing the total volume (V) in liters by the number of syllables produced.

Table 1. The liters per syllable of air expired during repetitions of /bɑ bɑ bɑ/ by five nondysarthric and four dysarthric spastic children.

Subjects		*Liters (BTPS) per Syllable /bɑ bɑ bɑ/*
Nondysarthric Group	B. W.	.02
	B. M.	.02
	K. K.	.03
	E. T.	.04
	D. H.	.04
Mean		.03
Dysarthric Group	E. M.	.05
	G. G.	.05
	L. F.	.07
	R. G.	.06
Mean		.053*

*$t = 14.285$, $df = 7$, t of 1.895 needed for 10% level of confidence.

Figure 5 is a drawing of a tracing made with a respirometer which shows the volume of air expired during speech production. By dividing the volume of air expired during a given speech utterance by the number of syllables in the utterance, the measure of 'liters per syllable' is determined. Benson (*1*) has found that physiologically normal children who have normal speech are relatively consistent with respect to the amount of air per syllable expired during repetitions of /CV/ syllables. For example, his subjects expired, on the average, .030 liters of air per syllable when repeating /bɑ bɑ bɑ/.

Table 1 shows the measures of 'liters per syllable' taken during repetitions of /bɑ/ by a group of nondysarthric and a group of dysarthric spastic children. It shows that the children who had oral involvement used more air per syllable than did the children who had no paresis of the articulators. That is, the dysarthric children did not appear to valve the air stream as efficiently during the

speech activity as did the nondysarthric group. It should be noted that the nondysarthric children used aproximately the same amount of air for production of these syllables as did Benson's group of physically normal children.

In view of these data it seems tenable to assume that the dysarthric group of children, with their inefficient valving of the air stream, would be unable to generate as much intraoral pressure per given volume of air as the nondysarthric group. It may be that the paresis of these dysarthric subjects' tongues, lips, and/or jaws contributes to their difficulty in producing intraoral breath pressure necessary for production of consonant sounds.

Space does not permit a description of techniques used to assess the muscular control of a child's tongue, lips, and jaw. Such techniques are described in the literature (*10*, pp. 3-14). However, such an assessment appears to be a necessity since the data presented suggest that the amount of air used by these children for speech is related to the extent of their dysarthria and may also be related to their intraoral breath pressure potential during speech.

Discussion

During the latter stages of this article, assumptions have been made regarding the meaning of certain data which are, thus far, relatively meager. However, these data are being extended almost daily. The assumptions and tentative conclusions appear to be substantiated by the growing body of information. As work progresses and as the data lead to more definitive conclusions and hence to still more research, it is hoped that one day relatively precise measures of the ability of children with cerebral palsy to generate intraoral breath pressure during speech will be forthcoming. Perhaps in the foreseeable future, routine clinical tests will be available for evaluating in its entirety this aspect of the neuromuscularly handicapped child's physiological readiness for speech production. Then reliance will not have to be placed upon clinical hunches and subjective observations to evaluate a process so complex that evaluation by intuition is almost impossible.

As these definitive diagnostic techniques are refined, speech clinicians working in the area of cerebral palsy may be able to design their habilitation programs with more confidence. They will have available procedures to evaluate the effectiveness of their clinical program whether they are working with a child's palate, respiratory system, and/or his articulators. As the research discussed here progresses and is refined, evaluation of at least one aspect of the physiological readiness for speech of the child with cerebral palsy, his ability to produce intraoral breath pressure, may become precise and quantifiable.

It should be noted that no discussion has been given here on the concept of 'breath control' as it applies to the speech breathing problems of children with cerebral palsy. The concept that 'breath control problems,' i.e., that involuntary action of the breathing musculature may affect the ability of the child with cerebral palsy to control the air stream, may be related to the pressure producing potential of such a child insofar as lack of 'breath control' results in insufficient production of pressure. It is the thesis of this writer, however, that the concept of breath control, per se, might more appropri-

ately be applied to a child's ability to accelerate or decelerate the volume flow of air from his lungs at will, expire or inspire at will, and otherwise regulate his breathing pattern. The concept of 'breath control,' its operational definition, and its application to the breath pressure producing potential of children with cerebral palsy is the focus of still other current research efforts at the University of Iowa Hospital School for Severely Handicapped Children.

Summary

It is suggested that the evaluation of the ability of a child with cerebral palsy to generate intraoral breath pressure is necessary if his physiological readiness for speech is to be thoroughly assessed. Malfunction of at least three musculatures may contribute to difficulty in such a child attaining that pressure. These musculatures control (a) the palate, (b) the respiratory mechanism, and (c) the articulators (tongue, lips, and jaw).

Procedures for evaluating the great variety of palatal malfunctions found in the cerebral palsy population are explained and seem rather definitive and useful for clinical planning. A procedure for evaluating the pressure producing potential of the neuromuscularly involved child's respiratory mechanism is not, as yet, as definitive as would be desirable in describing a physiological breakdown directly related to speech problems. Research currently in progress may yield more definitive methods.

No attempt is made to describe techniques used to evaluate a child's oral paresis. Such an evaluation is suggested as necessary since paralytic involvement of the articulators may significantly affect the ability of a child with cerebral palsy to impede the air stream during speech in an efficient manner. As a consequence, oral paresis may be related to intraoral breath pressure problems during consonant speech sounds production in cerebral palsy.

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Who Wants to Be an Oyster?

. . . To live creatively, we must be willing to be *a little vulnerable.* We must be willing to be *hurt a little*—if necessary, in creative living. A lot of people need a thicker and tougher emotional skin than they have. But they need only a tough emotional hide or epidermis—not a shell. To trust, to love, to open ourselves to emotional communication with other people is to run the risk of being hurt. If we are hurt once, we can do one of two things. We can build a thick protective shell, or scar tissue, to prevent being hurt again, live like an oyster, and not be hurt. Or we can 'turn the other cheek,' remain vulnerable and go on living creatively.

An oyster is never 'hurt.' He has a thick shell which protects him from everything. He is isolated. An oyster is secure, but not creative. He cannot 'go after' what he wants—he must wait for it come to him. An oyster knows none of the 'hurts' of emotional communication with his environment—but neither can an oyster know the joys. (From Maxwell Maltz, *Psycho-Cybernetics,* Englewood Cliffs, N. J.: Prentice-Hall, 1960.)

Surgical Management of Palatal Paresis and Speech Problems in Cerebral Palsy: A Preliminary Report

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Research on the speech of individuals with cleft palates has demonstrated that closure of the nasopharyngeal port is needed for satisfactory speech production. If a child has a palate which is so defective structurally or physiologically that such closure cannot be attained, he will have difficulty acquiring proper articulatory skills. Spriestersbach and Powers (7) have reported that children with cleft palates who could achieve velopharyngeal closure may have speech problems. However, they found no children in their study who had velopharyngeal incompetency and who manifested normal articulation skills. Subtelny and Subtelny (*8*) studied the speech problems and physiological correlates of adults with cleft palates. Once again, no subject was found who had poor palatal function who manifested normal speech. In these and other studies (*4*, *5*, *6*), analysis of articulation errors of speakers with cleft palates who manifest poor velopharyngeal closure suggests strongly that their articulation problems result from their inability to generate intraoral breath pressure during speech. The speech elements which require relatively high intraoral breath pressure are consistently defective in this population.

It has been pointed out (*1*, p. 366, *2*, *3*) that children with cerebral palsy may have palatal paresis or paralysis which results in velopharyngeal incompetence during speech. However, most reviews of the physiological defects in the speech mechanism of persons with

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cerebral palsy make only a cursory mention of palatal dysfunction in discussing the factors related to their speech problems. In some reviews velopharyngeal incompetence is not mentioned at all. Because this important physiological process of speech had received relatively meager attention and because complex physiological breakdowns in other aspects of the speech mechanism exist in this population, the present clinical team cautiously explored the possibility of managing the problem through surgical procedures. Yet, it appeared obvious that in selected cases such management seemed to be the only reasonable approach to further remedial speech work.

Since there are inherent dangers in any type of surgical procedure and since such a procedure had not, to the knowledge of the present authors, been attempted previously with a child who had cerebral palsy, care was used in choosing a first subject. It was deemed necessary that any candidate's psychological and social readiness for speech improvement should be at a maximum. Parental guidance and parental cooperation had to be such that the home situation would be a positive factor in the habilitation effort. Other physiological problems, such as a paretic tongue or respiratory mechanism, should be at a relative minimum in order to insure that any type of benefit realized from the surgical procedure would not be obscured by these other physiological deficits. Moreover, it was decided that there should have been ample opportunity to demonstrate that the palate of a given subject was not amenable to usual therapeutical procedures designed to improve velopharyngeal function.

Case Histories

The following case histories are presented to illustrate instances in which a surgical procedure was utilized in an attempt to improve the physiological readiness for speech of children with cerebral palsy:

Case 1. When the diagnostic procedures described by Hardy (3) showed conclusively that David M. (date of birth, April 9, 1949; diagnosis, cerebral palsy, athetosis, quadriplegia, moderate) was unable to achieve velopharyngeal closure during speech attempts, he was considered for surgical management of his palatal paresis. From the age of four to the present evaluation David engaged continually in remedial speech programs which included activities designed to improve his breath control for speech production. These activities, blowing out candles, repeating speech sounds, etc., were of the type which also would have helped the boy develop velopharyngeal closure and oral direction of the air stream if his palate had been amenable to training. It was therefore concluded that David's palate was not trainable since it had not responded in any way to six years of such work.

At the time of evaluation for surgery, David's psychological and social readiness for speech seemed to be optimum. A Leiter International Scale which was administered in March 1959 yielded a score which suggested that David was in the 'dull normal' range of measured intelligence. However, David's academic progress was such that his intelligence was believed to be above that level. He was socially active, and he seemed to have a keen desire to improve his speech skills. David's parents had previously demonstrated objectivity and willingness to cooperate in home programs for their child.

The condition of David's articulators, other than his palate, was rated as three, 'moderately' paretic, on a five-point scale of neuromuscular involvement. On this scale a rating of one represents 'severe involvement' and a rating of five represents 'no involvement.' He was also judged to have a 'moderately severe' problem of breath control and was given a rating of four on the five-point scale.

David's speech prior to surgery was

judged 'unintelligible most of the time.' He omitted and distorted most sounds requiring intraoral breath pressure; he spoke in very short, jerky phrases; and he had a breathy, nasal voice quality.

During activities such as coughing, gagging, and swallowing, David's palate was quite active. It showed what might be considered normal movement during these reflexive acts on cinefluorographic film. The phenomenon of relatively normal palatal movement during reflex activities with abnormal or absent palatal movement during voluntary activities in the palates of children with cerebral palsy is described in some detail by Berry and Eisenson (*1*, p. 366). Such reflex activities may occur in a given musculature in the presence of an upper motor neuron lesion while voluntary activities will not.

The type of surgical procedure to be used was dictated by the fact that these reflex activities existed. At any time when the child gagged, coughed, or swallowed, his palate could be expected to move vigorously. Moreover, the palate was structurally intact. The use of an obturator or any surgical procedure which would interfere with the movements of the palate was precluded by these conditions. A pharyngeal flap seemed to be the surgical procedure of choice, and it was accomplished in August 1959.

The most notable changes in David's speech immediately subsequent to surgery were (a) an increased verbal output and (b) a reduction in his hypernasal voice quality. With respect to the former speech attribute, it was obvious that the closed velopharyngeal port gave David much more oral air to use for speech production. His spoken syllables per phrase and the length of his verbal response increased notably. Moreover, the greater utilization of the air stream for speech production seemed to result in a lessening of the 'jerky phrases,' since David no longer had to inhale between each one or two syllables.

David was again enrolled in a remedial speech program in September 1959. Initially, articulation work was directed primarily toward production of fricatives and sibilants. Teaching David to phrase more effectively and to make more adequate use of his available breath supply had to be restructured because of his increased oral air supply. In February 1960, a program was initiated which utilized a dual electrical muscle stimulator to superimpose a slow regular breathing pattern upon David's respiratory pattern. The primary goal was to slow down the boy's rapid breathing. Prior to the initiation of electrical stimulation David had made excellent progress in developing ability to produce speech sounds. In fact, in isolated, single syllable words, he could produce all of the General American English phonemes. In connected speech, however, his articulation was relatively poor, due to his limited breath control and dysarthria.

A more meaningful comparison of David's improvement in speech during the one-year postsurgery period is reflected by scores of speech tests. In May 1959, two-and-one-half months prior to surgery, he could correctly articulate 57 of 112 selected items of the Templin-Darley Articulation Test (*10*). In September of that year, six weeks post surgery, he could correctly articulate 64 of the same 112 items. In February 1960, David could produce 84 of the items correctly, and in May he produced 89 correctly. On this last articulation test /r/ and /l/ blends were the consonant elements which gave David the most difficulty. Problems with these sounds are probably related more to his dysarthria than to a pressure-producing disability. He misarticulated only eight of 26 sibilant and fricative (high pressure) elements in the articulation test. Six of these fricatives and sibilants were /s/ blends. The dramatic improvement which this boy made in developing articulation skills following pharyngeal flap surgery is demonstrated by these scores. He made more progress, in terms of numbers of speech elements acquired, in nine months post surgery than he had in the four years prior to surgery during which he had been a resident patient at the University Hospital School.

Another indication of the boy's improved ability to communicate verbally is reflected in his 'mean length of response' (*9*, pp. 76-81). Ten months prior to surgery his mean length of response was 3.0 words. Six months post surgery, it was 7.6 words. Improvement in this regard seemed attributable to the fact that David no longer lost large quantities of air through his nose during speech. He therefore not only had more oral air to use for speech on a given expiration, but

producing longer speech utterances seemed physiologically easier for him.

One more interesting, and unanticipated, favorable result of the surgery was that David could be given verbal items of psychological tests because of his improved communication abilities. Prior to surgery his speech was so unintelligible that verbal items could not be administered. In February 1960, he scored in the 'average range' of measured intelligence on the Wechsler Intelligence Scale for Children. This estimate of the boy's intellectual capacity seems more commensurate with his academic progress than the results of previous psychometric evaluations which were based solely on performance scales.

In May 1960, when David was dismissed for his summer vacation from the University Hospital School, his speech was judged to be 'intelligible most of the time.' Currently, there are times when David can be understood only with difficulty. These breakdowns in his intelligibility seem related primarily to his inability to produce long, controlled expirations for the production of speech.

David's pharyngeal flap surgery has produced more beneficial results than had been anticipated. At this time, his speech breathing problem seems to be the major obstacle to David's using completely intelligible speech. Hopefully, the electrical stimulation program currently in progress will help him in this regard.

Case 2. Eddie G. (date of birth, December 12, 1948; diagnosis, athetosis (Rh) quadriplegia, moderately severe) was the second child considered for surgical procedure of palatal paresis. Eddie routinely scored within the 'average' range on untimed performance scales of psychometric evaluations. His athetosis lowered his performance to the 'dull normal' range when such items were timed. Eddie has made satisfactory progress in academic work. He is somewhat mischievous. Some of the inconsistency in using his 'best speech skills' could be attributed to the inconsistent palatal function which is described elsewhere (3). However, it seemed obvious to those who knew Eddie that he was usually careless in articulation. His parents have cooperated with the University Hospital School staff, and they have shown good insight into management of the child's problems.

Eddie was judged to have 'no involvement' of his jaw; he had 'mild' involvement of his tongue and 'no involvement' of his lips. He seemed to have little difficulty in breath control. Thus, his complicating physical problems with respect to speech production were considerably less than those of Case 1. He does, however, have a severe bilateral high-frequency hearing loss.

Eddie was extremely retarded in the development of speech skills; he said his first word at the age of three years. At the age of six years, four months, he was estimated to have a vocabulary of 50-75 meaningful words. His progress in the acquisition of speech and language skills was slow but steady until the school year of 1958-1959. During that year, he greatly improved his articulation. His mean length of response and use of grammar also accelerated during that period. However, from September 1959 through May 1960, he made little or no progress with respect to these attributes of speech and language. The deviant speech elements which resisted remedial efforts were /θ/, /ð/, /s/, /z/, /ʃ/, /ʒ/, /tʃ/, /dʒ/, and /r/ blends. Moreover, Eddie could not produce /ʒ/, /tʃ/, and /dʒ/ in any phonetic context. As explained elsewhere (3), it was finally determined that the boy's paretic palate was a significant factor which was related to these articulation errors. In August 1960, Eddie underwent a pharyngeal flap procedure which, it was hoped, would enable him to achieve readily intelligible speech.

It is too early at this time to determine the complete beneficial results of the surgery with respect to this child. However, three months after surgery impressions are as follows: (a) When pressed for accurate speech production, Eddie can produce all speech sounds of General American English. Usually, however, he continues to be careless during conversational speech and intelligibility suffers as a result. (b) His speech is more intelligible than before surgery as he now produces more sibilant and fricative sounds in connected speech. His score on an articulation test is essentially unchanged. (c) His mean length of response has not changed significantly. (d) Prior to surgery he was extremely nasal. Now his voice quality is normal in this respect. (e) He will need a long period of postsurgery speech work before the effects of surgery can be thoroughly ascertained.

It must be expected that the need for postsurgical remedial speech work for neuromuscularly handicapped children will be greater than with cleft palate children. The children with cerebral palsy will have developed deviant articulatory motor patterns of their tongue, lips, and jaw which are not as subject to change through training as is the case of the neuromuscularly normal child. For example, immediately after surgery Eddie could not produce /tʃ/ and /dʒ/. Whenever these sounds were attempted, his old inappropriate tongue pattern seemed to 'take over.' Eddie has now learned to overcome such problems of articulatory movement in many phonetic contexts. He is learning other articulatory patterns which he had been unable to learn prior to the surgery. He seems to be better motivated to overcome his dysarthria since he is able to achieve intraoral breath pressure.

Eddie's hearing loss is, of course, a complicating factor in his learning to produce high-pressure speech elements which also have a great deal of acoustic energy in the high frequencies.

Case 3. Mike P. (date of birth, October 10, 1954; diagnosis, cerebral palsy, spastic quadriplegia) was first admitted to the University Hospital School at the age of five years, three months. Prior to that time he had been followed on an outpatient basis since he was one year, nine months of age. Mike's psychological and social readiness for speech appeared good. He performed relatively well on psychometric evaluations when it is considered that he had only fair hand usage and unintelligible speech. He progressed satisfactorily in a kindergarten classroom. A socially active child, Mike appeared to be highly motivated to communicate through speech.

Mike's lips were judged to be 'moderately' involved; his tongue was judged to be involved to a 'moderately severe' degree. His jaw control appeared essentially normal. Mike's breath control seemed fairly good, but his 'breath support,' as defined by oral manometer measures and lung capacity, seemed relatively poor. Palatal dysfunction characteristic of this boy's situation is described elsewhere (*3*).

Two outstanding differences between Mike and Cases 1 and 2 were recognized during his evaluation as a possible candidate for surgery: (a) Mike is considerably younger than the other two children. However, one year of remedial speech work suggested that his palate was no more trainable than those of the other two boys. It seemed advisable to use a pharyngeal flap with Mike so that he might have a palate which would be functional for speech production purposes through the first years of his primary education. It was hoped that he would have the opportunity to develop correct motor patterns for speech production before inappropriate patterns became strongly learned. (b) Mike was a spastic while the other two children were athetoids. However, there seemed to be no reason to believe that the surgery would have different effects with a spastic than an athetoid. The authors are hopeful of the favorable outcome of this procedure with such a young child.

Mike's pharyngeal flap surgery was performed in November 1960. At the time of writing it is possible to make the following judgments of the effects of that surgery: (a) Mike's mean length of response has increased. Whereas prior to surgery he produced one and two syllables on an expiration, he is now using two and three words per respiration cycle during speech. (b) His voice is less nasal. (c) His articulation of consonant sounds is improved, particularly postvocalic plosives. (d) His pressure ratio on the oral manometer is now equal to one. The immediate postsurgery results are much better than were anticipated.

These preliminary results are sufficiently encouraging to merit further attempts to improve the physiological readiness for speech of children with cerebral palsy and significant palatal paresis through the use of pharyngeal flap surgery.

Summary

Recent work dealing with the incidence and type of palatal dysfunction in cerebral palsy has highlighted the need for consideration of palatal paresis as a major factor in the speech retardation of many children with this condition. In some cases this paresis

does not seem to be amenable to correction by nonsurgical procedures. Therefore, some type of surgical management seems indicated in order that these children may obtain intraoral pressure for speech production.

At this writing pharyngeal flap surgery has been performed on three children. Two of these children were over 10 years of age when operated, and they had developed certain deviant motor patterns of their tongue, lips, and jaw during speech production. Even so, the surgical procedure seems to have enabled them to make good speech gains. A younger child with cerebral palsy and associated palatal paresis has been operated to enable him to attain intraoral breath pressure so that he may have the advantage of being more physiologically ready for speech learning during the early years of his life.

It is emphasized that surgery would not be recommended for a child who has such severe physical problems (i.e., a severely paretic tongue, a markedly deviant breathing pattern, etc.) that the benefits to be derived might be highly questionable. Furthermore, it is felt that the child should have the social and psychological maturity which would enable him to profit readily from being able to achieve intraoral breath pressure for speech production purposes.

Although the use of the pharyngeal flap operation in connection with the rehabilitation of individuals with cerebral palsy is in the stage of investigation, the prospects seem very promising.

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Articulatory Skill, Physical Management, and Classification of Children with Cleft Palates

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Although the status of articulation in persons with cleft palate has been evaluated in several studies, it has not been related to type of physical management. This study was designed primarily to determine whether there was a difference in articulation skill among persons who had cleft palates repaired surgically and those who were treated prosthetically. Total articulation scores of subjects from these two groups were treated statistically. Since it has been reported that articulation of plosive sounds is most directly dependent on palatopharyngeal closure (*8*) and that voiceless sounds require the greatest oral breath pressure (7), the two treatment groups in the present study were also compared for their articulation of the plosive sound [p] in the initial and final positions. In addition, the subjects with the highest total articulation scores and those with the lowest scores were described in terms of method of repair.

Several additional problems were also considered. The subjects were grouped according to classification of cleft, and the groups were evaluated for differences in articulation. Interjudge agreement on status of consonants, percentage of correct production of selected consonants, and the relationship between these measures were examined.

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Procedure

The sample consisted of 40 persons who were evaluated in the University of Kansas Medical Center Cleft Palate Clinic between September 1958 and March 1960. All clients within a specified age range and with normal or close to normal hearing were included in the study. The subjects, 25 boys and 15 girls, ranged in age from seven years six months to 18 years, 11 months, with a mean chronological age of 11 years, five months. No person had a hearing loss in the better ear greater than 20 decibels in the speech range. Although in-

TABLE 1. Distribution of subjects, mean articulation scores, and range of articulation scores according to method of physical restoration and classification of cleft.

Physical Restoration	*Classes I and II*			*Class III*			*Class IV*		
	N	*Mean*	*Range*	*N*	*Mean*	*Range*	*N*	*Mean*	*Range*
Surgery	10	84.7	33.2-97.1	9	78.9	58.4-97.3	5	77.7	50.0-92.4
Prosthesis	0			2	74.7	74.3-75.0	5	77.1	46.1-92.0
Surgery plus prosthesis	2	84.9	79.2-90.5	4	77.0	55.2-95.5			
No repair	2	54.2	44.8-63.6				1	53.7	
Combined	14	80.4	33.2-97.1	15	77.8	55.2-97.3	11	75.2	46.1-92.4

tellectual ability was not measured, none of the subjects were in special classes.

Table 1 provides information about the distribution of subjects according to physical management and classification of cleft. Palatal restoration for 24 of the subjects had been accomplished by surgery only, for seven by prosthetic appliances with speech bulbs only, and for six by early palatal surgery which was later supplemented by speech appliances. Three of the subjects had no palatal restoration. For the analysis of articulation data those who wore speech appliances were considered prosthetically repaired regardless of whether the palate had also been treated surgically. Fourteen subjects had postalveolar clefts only; 15 had unilateral complete clefts; and 11 had bilateral complete clefts.

The Hejna Picture Articulation Test was administered to each subject in a quiet room. All responses were tape recorded. Twenty-three single consonants and nine consonant blends were evaluated in this project. When a subject did not spontaneously name the picture which was presented to him, verbal stimulation was utilized to elicit the desired response. All subjects, however, did not respond to these stimuli with the desired word. Therefore, total articulation scores and the percentage of correct production of consonants were figured in proportion to the number of appropriate responses.

The recording of each subject was evaluated simultaneously and independently by three judges (the authors) after a practice period during which similar material was utilized. Each tape, which was identified by code number, was played twice, once uninterrupted and once with an approximate five-second pause after the word responses which were used for evaluating each test phoneme.

Test sounds were judged by each scorer as either correct or incorrect. Substitutions, omissions, additions, and distortions including nasal emission were all classified in the incorrect category. If all test phonemes produced by a subject were correctly articulated, he received a score of 100. An articulation score representing the percentage of correct responses for each subject was computed independently by each judge. The mean of the three scores was then utilized in the statistical analysis of the data for treatment groups and for cleft classification groups.

TABLE 2. Means and range of articulation scores for two treatment groups.*

Treatment	*N*	*M*	*Range*
Surgery	24	81.1	33.2-97.3
Prosthesis	13	77.9	46.1-95.5

*The two subjects with no treatment and the one who did not wear his appliance were not included in this portion of the analysis.

Percentages were computed to determine the extent to which the three possible combinations of judges agreed in evaluation of articulation responses. The number of times that the judges agreed with one another about the status of production of a phoneme was compared with the total number of possible agreements. These percentages were obtained for initial, medial, and final consonants as separate categories, and then combined. The nine blends were similarly treated.

The percentages of correct responses for each test consonant in each position and in the combined positions were determined. A sound was treated as correct when two or more judges agreed.

RESULTS

The Mann-Whitney *U* test (*5*, pp. 116-127) was used to compare the articulation scores of subjects who had received surgical restoration with the scores of those who were treated prosthetically. The obtained *U* of .75 was not significant at the .05 level. Thus, one may conclude that the two groups did not differ in articulation proficiency. An examination of the mean articulation scores of the two treatment groups (Table 2) indicates that only three points separate the means of the two treatment categories. The range of scores for the two groups is also similar. Examination of percentages of correct responses for the [p] sound did not indicate any differences between the two treatment groups.

Information was not available on type of surgery for all the subjects. However, a review of the records of the 10 children whose articulation scores were 90 per cent or higher indicated that for seven of the 10 surgery was the only type of physical restoration. Surgical data were available for five of the seven who had undergone surgery only. Surgical procedures utilized included the Von Langenbeck, Wardill, Brown-Dorrance push-back, and pharyngeal flap operations. Two of

TABLE 3. Interjudge percentages of agreement for correct or incorrect responses for single consonants and consonant blends.

Judges	*Percentage of Agreement*				
	Initial Consonants (N = 22)	*Medial Consonants* (N = 21)	*Final Consonants* (N = 19)	*Combined Positions* (N = 62)	*Blends* (N = 9)
1 and 2	85.1	83.9	80.7	83.5	77.6
1 and 3	87.2	87.5	78.9	84.7	78.8
2 and 3	89.7	86.4	79.2	85.3	80.0

the subjects with scores of 90 or higher had both surgery and prosthesis, and one had prosthetic repair only. Both subjects who had surgery and prosthesis had received Von Langenbeck procedures at 18 months of age and later had been fitted with prostheses.

The records of the 11 subjects whose articulation scores were less than 70 per cent provided no information about specific surgical procedures. Five were treated by surgery only, two had combinations of surgery and speech bulbs, two had not been treated at the time of the evaluation, and one did not wear the prosthesis that he possessed. These data are not adequate for a comparison of potential effects of one surgical procedure with another.

The Kruskal-Wallis one-way analysis of variance (*5*, pp. 184-193) was used to compare articulation among the subjects grouped according to classification of cleft. The obtained *H* of .83 was not significant at the .05 level. The Class I and Class II clefts, which were com-

TABLE 4. Total interjudge percentages of agreement and percentages of correct responses for each consonant in each position.*

Consonants	*Total Percentages of Agreement for All Judging Combinations* Position			*Percentages of Correct Responses for All Consonants* Position		
	Initial	*Medial*	*Final*	*Initial*	*Medial*	*Final*
[s]	70.0	67.5	76.7	45.0	55.0	50.0
[z]	86.3	73.3	71.1	62.5	47.5	50.0
[d]	74.8	86.7	69.4	62.2	70.0	40.5
[v]	72.1	75.8	55.0	58.8	92.5	47.5
[tʃ]	84.6	80.4	85.8	67.5	67.6	72.5
[ʃ]	67.6	75.4	75.4	68.4	66.7	79.5
[θ]	75.0	74.6	65.0	70.0	73.7	75.0
[ð]	68.0	75.7		68.0	79.2	
[g]	88.6	87.5	80.0	71.8	92.5	75.0
[k]	89.7	91.7	86.7	85.0	84.4	75.0
[t]	95.0		71.7	97.5		67.5
[p]	91.2	89.5	78.3	89.4	76.9	90.0
[f]	90.0	95.4	85.0	87.5	97.2	85.0
[b]	95.5	91.5	82.1	92.5	92.5	84.6
[l]	91.7	89.1	75.3	97.5	94.9	82.5
[r]	91.7	93.3	95.0	95.0	90.0	90.0
[d]	86.7	86.7	90.0	90.0	87.5	100.0
[w]	96.5	90.7		97.3	94.4	
[m]	94.9	96.6	93.2	97.4	94.9	97.4
[n]	100.0	92.8	96.6	100.0	100.0	95.0
[j]	100.0	98.3		100.0	100.0	
[h]	100.0	91.2		100.0	100.0	
[ŋ]			76.7			100.0

*Percentages of correct responses for the consonant blends: [sl] 38.5; [skw] 43.6; [sw] 50.0; [st] 56.4; [br] 73.0; [dr] 79.5; [kl] 84.6; [tr] 87.5; and [pl] 93.9. The blends were tested in the initial position, except for [pl] and [bl] in the medial and [st] in the final position.

TABLE 5. Mean interjudge percentages of agreement and mean percentages of correct responses for each tested consonant.*

Consonant	Total Number of Times Tested	Mean Percentages of Agreement		Percentages of Correct Responses	
		Rank	%	Rank	%
[s]	120	2	71.4	1	50.0
[z]	117	7	76.9	2	53.4
[d]	114	8	77.2	3	57.9
[v]	114	1	67.7	4	66.7
[tʃ]	113	10	83.8	5	69.2
[ʃ]	113	5	72.9	6	71.6
[θ]	118	3	71.5	7	72.9
[ð]	49	4	71.7	8	73.5
[g]	118	11	85.3	9	79.8
[k]	111	15	89.2	10	81.3
[t]	80	9	83.3	11	82.5
[p]	90	12.5	86.6	12	87.9
[f]	116	18	89.9	13	89.7
[b]	119	17	92.4	14	89.9
[l]	119	12.5	86.6	15	91.6
[r]	120	18	93.3	16	91.7
[d]	120	14	87.8	17	92.5
[w]	74	19	93.7	18	95.9
[m]	117	20	94.9	19	96.6
[n]	115	22	96.5	20	98.3
[j]	79	23	99.2	22	100.0
[h]	78	21	95.7	22	100.0
[ŋ]	40	6	76.7	22	100.0

*Percentages were computed on the basis of the total number of responses for each position, rather than by averaging the available percentages from Table 4.

bined because of the small *N*, had the highest mean articulation score; Class III, the next highest; and Class IV, the lowest (Table 1). The mean articulation scores for the three classifications differed by no more than five points. These results suggest that articulation skill does not vary with type of cleft.

The interjudge percentages of agreement in assigning the test phonemes to either a *correct* or *incorrect* category are given in Table 3. The percentages obtained for the phonemes in the combined positions ranged from 83.5 to 85.3 for the three judges and are comparable to those obtained in other speech studies (*1*, *4*, *10*). The agreement is sufficient to warrant confidence in the results that are reported. It should be noted, however, that the percentages of agreement for the single consonants in the final position and for the consonant blends tend to be somewhat lower than those for the single consonants in the initial and medial positions.

The total interscorer percentage of agreement for each sound in each position was also determined. The results,

reported in Table 4, suggest that certain consonants tend to be more difficult to evaluate as correct or incorrect. The [ʃ], [ð], and [s] in the initial position, [s] and [z] in the medial, and [v], [θ], and [dʒ] in the final position had the lowest combined percentages of agreement among the three judges. The percentages for initial consonants ranged from 67.6 to 100; for medials, from 67.5 to 98.3; and for finals, from 55.0 to 96.6. As a group the fricatives were most difficult to evaluate, followed by the plosives, glides, and nasals.

The single consonants evaluated in this study are presented according to percentages of correct responses in Table 4. The results support observations that speakers with cleft palates as well as other persons with speech problems have their greatest difficulty with the fricative sounds (*3*, *6*, *9*, p. 216). Seven fricatives, [s], [z], [dʒ], [v], [tʃ], [ʃ], [ð], and one plosive, [t], were correct less than 70 per cent of the time, in at least one position. Six of these are postdentals, one a labiodental, and the other a linguadental consonant.

The total percentages of agreement for each phoneme in all tested positions were combined. Information in Table 5 indicates that ranking of sounds according to interjudge percentages yields results similar to ranking by the per cent of correct responses. It would appear that the sounds which persons with speech problems most frequently misarticulate are the sounds for which interjudge scoring reliability is the lowest.

Discussion

The comparison of the articulation proficiency of the subjects in the two treatment groups indicated that similar speech results can be obtained with either surgical or prosthetic restoration. Therefore, criteria in addition to the speech result should be utilized in determining the best treatment for the subject. Variables, such as presence of hearing loss, availability of general dental and prosthetic care, and extent of the anatomical defect, should be considered when a treatment program is being initiated. Since good speech results can be obtained with prostheses, surgeons need not feel obligated to operate when they think the prognosis is poor; nor should the prosthodontists recommend speech bulbs for those whose opportunities for dental care are very limited.

The importance of a comprehensive initial evaluation of the child with a cleft palate and regular appraisals of his progress by a cleft palate team should be emphasized. All subjects in the present investigations were participants in a habilitation program. Some had reached the point where their only contact with a treatment center was for periodic check-ups. It is interesting to note that the 10 children with articulation scores above 90 per cent had been followed in the Clinic for several years. Ten of the 11 children with scores below 70 per cent had been seen only once or twice in the program, and the eleventh subject had not worn his appliance for several years.

The lack of differences in articulation according to classes of cleft is not supported by Spriestersbach and Powers (7), who found that, in general, persons with cleft lips and palates achieve better articulation than do individuals with cleft palates only. This discrepancy in findings could be a chance happening,

or it could reflect differences in the samples studied.

The finding of differences in percentages of agreement among judges for different sounds and for the same sound in different positions is of clinical importance. Perhaps some speech pathologists hold excessively high standards for the articulation of some consonants, particularly for those in the final position in words. The finding that percentage of agreement on articulation among judges tends to vary with the percentage of correct articulation responses may be a function of range of acceptability. Certain consonant sounds are articulated correctly by nearly everyone, and these can be judged very readily. However, as one evaluates fricative sounds particularly, the range of acceptability of the phonemes widens, and the problem of deciding whether or not a sound is correct or incorrect increases. With the increased difficulty in making a judgment, agreement among judges decreases. Research results in the area of articulation would be more comparable if a more standardized procedure of articulation testing and more definitive standards of phonemic accuracy were adopted by members of the profession.

The use of tapes in the experimental procedure may account in part for some of the lower interjudge agreements. No visual cues were available to the judges and the higher frequency sounds may have been unsatisfactorily reproduced. These two factors may have affected the judgments of consonants in the final position especially.

The relationship between understandability and articulation has not been considered in this study. This is a relationship that seems worthy of intensive investigation. Understandability which subsumes articulation, aspects of voice, and other factors might provide an index to speech adequacy superior to that provided by the articulation test—particularly for the client for whom perfect articulation is not attainable (2).

Summary

In a sample of older cleft palate children no statistically significant articulation differences were found (a) between those who were treated prosthetically and those who received surgery or (b) among the three cleft classification groups. Interjudge agreement concerning articulation accuracy and the frequency of correct responses for single consonants decreased in relation to the position of the phoneme in the word responses and according to the phonetic classification of the sound. Long-term team planning for children with cleft palate should result in more acceptable patterns of articulation.

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Khecari Mudra

One of the most important practices [of Yoga] is khecari mudra, because it is supposed to confer the gift of levitation. It is described at great length by the *Hatha Yoga Pradipika;* a shorter version is given in the *Gheranda Samhita:*

> 'Cut the lower tendon of the tongue, and move the tongue constantly; rub it with fresh butter, and draw it out (to lengthen it) with an iron instrument. By practicing this always, the tongue becomes long and when it reaches the space between the eyebrows, then Khecari is accomplished. Then (the tongue being lengthened) practice turning it upwards and backwards so as to touch the palate, till at length it reaches the holes of the nostrils opening into the mouth. Close those holes with the tongue (thus stopping inspiration), and fix the gaze on the space between the eyebrows. This is called Khecari. By this practice there is neither fainting, nor hunger, nor thirst, nor laziness. There comes neither disease, nor decay, nor death. The body becomes divine.

This technique is often called the King of Mudras. It is still actively practiced. (From Arthur Koestler, *The Lotus and the Robot.* London: Hutchinson, 1960.)

Articulation Variations Associated with Visceral Swallowing and Malocclusion

- *Marion Minst Ward*
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Because of fairly well-established knowledge concerning the development of articulation patterns and the significant influence of maturation on speech during the first three school years (*13*), speech correction teachers may begin screening in their schools at the third-grade level. Invariably questions concerning the etiology and prediction of articulation defects arise.

In search not only for a clue to the possible etiology of sound distortions that persist into and beyond the third-grade level, but also for a tool to predict these sound distortions, the authors have included in their routine speech examinations an analysis of the orofacial muscle patterns involved in swallowing. This factor was included in a speech survey of a total group of 24,657 children made during the school year 1959-1960. Of 1025 children found with articulation defects, 432 were reported to have atypical swallowing patterns with tongue thrust. The data suggested a possible relationship between functional articulation defects and atypical swallowing as well as a need for a more careful verification of the findings.

Concerning prediction, West, Ansberry, and Carr (*23*, pp. 315-316) and Van Riper and Irwin (*22*, pp. 66-67) agree that many children with articulation disorders acquire adequate articulation by the time they reach third grade. These authors also point out the difficulty of distinguishing children who require immediate direct speech correction from children who will eventually learn normal articulation. Recent research in predicting articulation growth from prognostic articulation testing has been reported by Snow and Milisen (*18*) and Carter and Buck (*3*). Steer and Drexler (*19*) have also reported on the possibility of using

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The results of this study were reported in part at the 1960 convention of American Speech and Hearing Association in Los Angeles.

kindergarten tests for predicting articulation ability.

Meager references to swallowing behavior appear in the speech pathology literature. Francis (*4*) and Shelton, Haskins, and Bosma (*17*) describe tongue thrusting and its possible relation to articulation defects. In the dental literature Jann (7), Strang and Thompson (*20*, pp. 74-76, 206), and Barber and Renfroe (*2*) describe tongue thrusting and its effect on dental structures. Neurologically, Kreig (*11*, p. 103) describes the swallowing reflex as being purely reflexive and visceral at birth, progressing to a conditioned, somatic type of behavior pattern with maturity. Etiologically, Straub (*21*), Andrews (*1*), and Meader and Muyskens (*14*, pp. 233-244) ascribe atypical swallowing to early feeding habits. Moyers (*15*, pp. 118-119) feels that this behavior may arise from enlarged or hypersensitive tonsils. In a study of orofacial behavior of 500 children attending an upper respiratory clinic, Leech (*12*) analyzed swallowing, lip incompetency, malocclusion, circumoral tension, sigmatism, infant feeding, finger sucking, and breathing habits. His findings suggest the need for further investigation in random population groups.

Although atypical swallowing behavior appears to be associated with dental malocclusions and articulatory defects, little has been reported about this behavior in the school-age child. Accordingly, a pilot study was designed (a) to study the swallowing behavior of a group of elementary school children and (b) to investigate the relationship of this behavior to other factors with which it is commonly associated. Such factors are articulation, dental occlusion, mouth breathing, lip competence, history of tonsillectomy, frenectomy, upper respiratory infections, finger-sucking habits, and early feeding.

Subjects and Procedure

A group of 358 children were selected in grades one through three from two schools in which there was no program of speech correction. The subjects included 120 children in grade one, 122 in grade two and 116 in grade three. The bases of selection of the children were normal hearing, at least normal intelligence, and average socioeconomic background. Pure-tone audiometric tests were administered to the children. Data concerning intelligence and socioeconomic background were taken from school records.

A pedodontist and two speech clinicians examined the swallowing behavior and the dental occlusion of the subjects. Swallowing behavior was dichotomized into somatic or typical swallowing and visceral or atypical swallowing.

According to Tully (*5*) and Jann (*8*, *9*), visceral swallowing is characterized in the following way: During the mylohyoid stage of swallowing, the posterior teeth are not brought together. The orbiculoris oris and other circumoral muscles exhibit a sphincteric or peristaltic form of behavior. The tongue *thrusts forward*, spreading out between the anterior incisors. These authors describe somatic swallowing as more highly selective activity of the orofacial muscles. The contraction of the masseter and the temporalis muscles brings the posterior teeth firmly together while the lips and cheeks remain in a relatively passive state. The tongue *remains within the oral cavity*.

TABLE 1. Totals and percentages of children having visceral swallowing, dental malocclusions, and articulation variations.

	Grade 1 (120)		*Grade 2 (122)*		*Grade 3 (116)*		*Total (358)*	
	N	%	*N*	%	*N*	%	*N*	%
Visceral Swallowing	79	65.8	95	78.7	92	78.6	266	74.3
Dental Malocclusion	28	23.3	67	54.9	75	64.7	170	47.5
Articulation Variations	76	63.3	75	61.5	81	69.8	232	64.8
Visceral Swallowing and Malocclusion	25	20.8	64	52.5	67	57.3	156	43.6
Visceral Swallowing and Articulation Variations	53	44.2	64	52.5	65	55.5	182	50.8
Visceral Swallowing, Malocclusion, and Articulation Variation	19	15.8	45	36.9	50	43.0	114	31.8

The technique of examining swallowing described by Gwynne-Evans and Tully (*5*, *6*) was used. Each child was asked to swallow. Circumoral lip action was noted. During the beginning stage of the swallow the lips were parted by using the thumb and forefinger of the right hand to depress the lower lip. In this way it could be observed fairly easily whether or not the teeth were separated and the tongue spread between the anterior incisors during the swallow. Angle's classification of malocclusion as given by Salzman (*16*, pp. 245-247) was the standard used for judging dental occlusion.

The investigators felt that it was necessary to obtain some estimate of their reliability in judging swallowing behavior and occlusion. Independent observations concerning these factors were made on the first 99 children (33 being selected from each of the first three grades) by each of the researchers. Upon comparison their findings were identical in over 90 per cent of the cases. The speech clinicians alone examined the remaining 259 children.

The descriptions of the methods of production of phonemes outlined by Kantner and West (*10*, pp. 194-198) were used as a guide in articulation analyses. Sounds [l], [n], [s], [z], [r], [θ], [ð], [ʃ], [ʒ], [t], and [d] were observed in their initial, medial, and final positions in isolation and in words. The sounds [s], [z], [t], [d], [l], and [n] were noted not only if omitted or distorted, but also if they were acoustically acceptable but produced differently, specifically with the tongue tip forward, on or between the incisors; [θ] and [ð] were noted if omitted or distorted, or if the tongue tip projected beyond the anterior incisors and touched the lips.

Gag reflex was elicited by stimulating the faucial region with a tongue depressor. Mouth breathing was observed by noting each child's breathing behavior while he was unaware that he was being watched. If the child's mouth hung open with no obvious discomfort

from rhinitis, he was considered a mouth breather. However, as the possibility of lingual-palatal coadaptation was not considered, this test was discarded as inadequate and this factor was not included in the study.

Lip competency was observed by requiring a child to hold his lips in a closed position for 60 seconds. When holding the position appeared difficult and there was obvious circumoral tension, lip closure was judged incompetent.

Data relating to the history of tonsillectomy, frenectomy, finger sucking, upper respiratory infections, early feeding, and age of weaning were obtained from parents' reports and school records for each child.

Findings

All data were coded and punched on IBM cards. A table of relationships was made in a counting sorter and percentages were calculated on a desk calculator.

Several pertinent trends seem to emerge from the data in Table 1: (a) Three quarters of the children manifested visceral swallowing with the incidence increasing from grade one to grade two and remaining fairly stable from grade two to grade three. (b) Nearly half the children had dental malocclusion with a sharp increase in incidence from grade one through three. (c) Almost two-thirds of the group had phoneme variations, the percentage remaining stable from grade one through three. (d) Malocclusion and visceral swallowing was present coincidentally in a high percentage (91%) of children. However, a group of children with visceral swallowing

Table 2. Totals and percentages of children having distortions of [t], [d], [l], [n], [θ], [ð], [ʃ], [ʒ], [tʃ], [dʒ] plus dental malocclusion and visceral swallowing.

	Grade 1 (120)		*Grade 2 (122)*		*Grade 3 (116)*		*Total (358)*	
	N	%	*N*	%	*N*	%	*N*	%
t/d	24	20.0	16	13.1	27	23.3	67	18.7
t/d+MV*	3	2.5	10	8.2	16	13.8	29	8.1
l	55	45.8	53	43.8	63	54.3	171	47.8
l+MV	12	10.0	32	26.2	38	32.8	82	22.9
n	18	15.0	12	9.8	13	11.2	43	12.0
n+MV	4	3.3	8	6.6	8	6.9	20	5.6
θ/ð	18	15.0	15	12.3	24	20.7	57	15.9
θ/ð+MV	5	4.2	10	8.2	20	17.2	35	9.8
ʃ/ʒ	15	12.5	8	6.6	5	4.3	28	7.8
ʃ/ʒ+MV	3	2.5	4	3.3	3	2.6	10	2.8
tʃ/dʒ	15	12.5	8	6.6	4	3.4	27	7.5
tʃ/dʒ+MV	4	3.3	4	3.3	2	1.7	10	2.8
s/z	30	25.0	42	34.4	33	28.4	105	29.3
s/z+MV	8	6.7	27	22.1	23	19.8	58	16.2
r	16	13.3	5	4.1	7	6.0	28	7.8
r+MV	3	2.5	2	1.6	6	5.2	11	3.1

*+MV = plus malocclusion and visceral swallowing

TABLE 3. Totals and percentages of variables associated with visceral swallowing.

Variable	*Total (358)* N	%	*Variable+ Visceral Swallowing* N	%
Boys	165	46.0	120	72.7
Girls	193	54.0	146	75.6
Tonsillectomy	102	28.5	80	78.4
Clipped Frenum	12	3.4	8	66.7
Finger Sucking	136	38.0	116	85.3
Upper Respiratory Infections	33	9.2	25	75.7
Lip Incompetency	48	14.0	39	80.2
Breast Feeding	46	12.8	37	80.8

did not show malocclusion. (e) Phoneme variations and visceral swallowing were present coincidentally in a high percentage (79%) of the children. Again there was a group of children with visceral swallowing who did not show articulation variations. (f) Visceral swallowing, phoneme variations, and malocclusion were present coincidentally in one-third of the children with the incidence rising sharply from grades one through three.

Deviations in production of [l] occurred most frequently, [s-z] was second, and [t-d] was third (Table 2). Visceral swallowing plus malocclusion was present in 47.9 per cent of the children with [l] deviations, in 55.2 per cent of the children with [s-z] deviations, and in 43.3 per cent of the children with [t-d] deviations.

The incidence of deviations of [s], [z], [l], [t], [d], [n], [θ], and [ð] did not decrease appreciably from grades one through three. However, there was an appreciable decrease in the deviations of [ʃ], [ʒ], [tʃ], [dʒ], and [r] from grades one through three.

The following findings from Table 3 appear pertinent: (a) Visceral swallowing was present in 78 per cent of the children with a history of tonsillectomy. This figure is just slightly above the incidence of visceral swallowing that appears in the population as a whole. (b) Visceral swallowing was present in 85 per cent of the children with a history of finger sucking. However, a large group of children showed visceral swallowing with a negative history of thumb sucking. (c) Incidence of frenectomy was negligible. (d) Incidence of the absence of the gag reflex was negligible. (e) Breast feeding was noted in 12.8 per cent of the children studied. In a further analysis of the health records of this group duration of breast feeding in nearly every instance ceased by four months and was accompanied by supplemental bottle feeding.

Table 4 shows that variations in weaning age are not accompanied by variations in the incidence of visceral swallowing. The percentage of visceral swallowing is comparable to that found in the total population.

TABLE 4. Percentage of children with visceral swallowing compared with age of weaning.

Age of Weaning	*Total (358)* N	%	*Visceral Swallowing* N	%
1 year	207	57.8	162	78.0
1 year, 6 months	94	26.2	61	65.0
2 years	27	7.5	20	74.0

DISCUSSION AND CONCLUSIONS

Before any conclusions are drawn from these findings, it should be reiterated that this is essentially a pilot study. All of the findings need to be subjected to careful verification. These

conclusions are presented as trends indicating a need for further investigation.

Swallowing Behavior. The data indicate that what has been called in the literature abnormal or infantile swallowing with tongue thrust, or reverse swallowing, is present far more frequently in an elementary school population than has been realized. Because of this finding the investigators question the validity of the terms abnormal, atypical, or perverted to describe this pattern of swallowing.

Visceral swallowing behavior does not appear to respond to maturational forces by the third-grade level. There is need for the investigation of this behavior in the following populations: (a) children throughout the 12 grades; (b) children in other cultures where infantile and early feeding is dramatically different from ours; (c) preschool children.

Articulation. Forward tongue-tip placement in the production of the lingual alveolar sounds was characteristic of the majority of the group studied. These children not only do not produce the tongue-tip phonemes in what has been traditionally accepted as normal but this forward placement remains consistent from grades one through three, apparently not altering with maturational forces.

The high coincidence of children with visceral swallowing behavior and phonemic variations seems to lend credence to the frequently reported clinical observation of speech correction teachers concerning the concurrence of tongue thrust and articulation disorders found in the children in their case loads.

It may be appropriate to reconsider the use of the term 'functional' in describing the majority of articulatory defects found in children in the elementary grades.

The presence of visceral swallowing in children with sound distortions at the first-grade level may well have predictive value. The efficacy of assigning these children to speech and orofacial muscle therapy should be explored at the first-grade level.

Dental Occlusion. The extremely high incidence of dental malocclusion found in third-grade children suggests that a program of orthodontic correction might be unrealistic. As the first three grades appear to be the period during which malocclusion develops, a possible partial solution may well be in the field of anticipation and prevention.

Assuming that orofacial muscle behavior contributes to the formation of the dental structures, a cooperative exploration into the possible alteration of these patterns by the dentist and speech correction teacher is indicated.

The incidence of children with visceral orofacial habits who do not manifest dental malocclusion indicates the possible involvement of other variables such as force and duration of orofacial muscle pressures, hardness of bone, growth rates, and personality factors, which need to be explored.

Feeding. Breast feeding was not the common method of feeding the children studied. This leads to speculation concerning the role artificial feeding and the nature of foods offered children in our culture may play in the conditioning of orofacial behavior. There was a great variation in the reported ages at which the children studied were weaned from the bottle.

Duration of bottle feeding apparently does not determine swallowing behavior.

Sucking Habits. Visceral swallowing was evident in a high percentage of the children who sucked their fingers. However, since there were many more children with visceral swallowing and no history of finger sucking, these factors do not seem related.

Summary

A group of 358 elementary school children in the first three grades were studied to determine their method of swallowing, articulation of tongue-tip sounds, and dental occlusion. Additional pertinent behavior including mouth breathing, lip competency, gag-reflex, early feeding habits, incidence of tonsillectomy and frenectomy, and finger sucking were also analyzed. Visceral swallowing behavior was evident in 75 per cent of the group. Dental malocclusion was evident in 47 per cent of the group. However, this percentage increased from grades one through three, reaching an incidence of 65 per cent at third-grade level. Articulation variations were evident in 64 per cent of the total group.

The study appears to confirm the following clinical observations: (a) Visceral swallowing is a typical method of swallowing at the age level of children in grades one to three. The presence of visceral swallowing may be a complicating factor interfering with the normal development of tongue-tip phonemes. The diagnosis of this factor should be considered in determining the appropriate grade level at which to begin speech correction. (b) Tongue-tip phonemes at this age level are produced by the majority of children in a more forward position in the mouth to the degree that they are dentalized and even interdentalized.

The research indicates the emergence of a syndrome consisting of forward placement of tongue-tip sounds, tongue thrusting during the act of swallowing, and incipient malocclusion which may be highly significant in the persistence of articulation variations and in the determination of the appropriate age level at which to begin speech therapy.

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MYSTERIES OF INDIVIDUAL MOTIVATION

We are a long, long way from understanding the complexities of individual motivation. We understand very imperfectly, for example, the inner pressures to excel which are present in some children and absent in others. We don't really know why, from earliest years, some individuals seem indomitable, while others are tossed about by events like the bird in a badminton game. Differences in energy and other physiological traits are partially responsible. Even more important may be the role of early experiences—relations with brothers and sisters, early successes and failures. We know, for example, that high standards may be a means of challenging and stimulating the child or, depending on the circumstances, a means of frightening and intimidating him. (From John W. Gardner, *Excellence*. New York: Harper, 1961.)

Prognostic Value of Imitative and Auditory Discrimination Tests

• *Mary Stuart Farquhar*

Recognition of the effect of maturation upon the sound development of young children has been cited by Templin (*12*), Roe and Milisen (*7*), Spriestersbach and Curtis (*10*), and others. Their data indicated that a substantial amount of articulation growth occurs between the ages of three and eight years. During this period maturation has great impetus and its influence no doubt accounts for the difference among children in their speed of learning. Although we have been aware of the effect of maturation upon sound development, there has been a paucity of prognostic studies which have investigated the factors related to the maturation of the speech of young children.

Pettit (*5*) examined the prognostic efficiency of a battery of tests frequently employed during speech diagnostic examinations. His research did not reveal any statistically significant items which could be correlated with articulation development. Snow and Milisen's (*9*) study indicated that a child's ability to imitate correctly his defective sound has prognostic value. Carter and Buck (*2*) evaluated the prognostic consequences of the imitation of nonsense syllables by first-grade children. Their investigation revealed that children who can achieve 75 per cent or more correction on the imitation of nonsense syllables will achieve 100 per cent correction nine months later.

Most authorities agree that training in auditory discrimination is an important part of clinical speech work for persons with articulation problems. However, published research indicates conflicting evidence regarding the relationship of articulatory skill and discrimination ability. Studies by Hall (*6*, chap. 23), Hansen (*3*), Averell (*1*), and others indicated that there was no significant difference in relation to speech sound discrimination and defective articulation. Conversely, the investigations of Travis and Rasmus (*13*), Kronvall and Diehl (*4*), Taylor (*11*), and Schiefelbusch and Lindsey (*8*) revealed that there was significant correlation between individuals who misarticulated sounds and an inability to discriminate speech sounds. It appeared that the two differences of opinion as to the discriminatory ability of young children warranted prognostic investigation.

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Purpose

The present investigation was limited to an exploration of the prognostic

value of tests which examined the kindergarten child's ability to discriminate and imitate only the correct form of his misarticulated sounds. The study was concerned with sounds misarticulated by the sample population; all sounds correctly uttered were excluded. A comparison was made of the speech development over a seven-month period with imitative and auditory discrimination tests.

Procedure

Selection of Sample. A Spontaneous Picture Articulation Test was administered to 300 kindergarten children during the second week of school in order to obtain a sample of each child's speech pattern as early in the academic year as possible. The articulation test examined the 14 most frequently misarticulated sounds in the speech patterns of young children and whenever possible each sound was examined in the initial, medial, and final positions. The number of misarticulated sounds in any one child's speech varied from one to all 14 sounds examined.

The Spontaneous Picture Articulation Tests were scored according to the Wood Articulation Index (*14*) and ranked in descending numerical order. The first 50 children who misarticulated one sound in at least two positions were selected to represent the 'mild' type of articulation difficulty. The children who had the 50 lowest Articulation Indices were chosen to depict the 'severe' type of articulatory disorder. The 59 males and 41 females who participated in this investigation did not receive any remedial speech training during the school year.

Testing Imitative Articulation and Auditory Discrimination Abilities. Two forms of testing were utilized. The imitative articulation tests consisted of an examination of the child's ability to reproduce after the examiner, the correct form of his misarticulated sound in isolation, nonsense syllables, and words. The auditory discrimination tests required that the child signify by clapping his hands each time he heard the examiner utter the correct form of his misarticulated sound among vowels, acoustically dissimilar sounds, and acoustically similar sounds.

As the tests were administered in relation to the child's misarticulations, the examining procedures were individualized from child to child. For example, if a child had only one misarticulated sound, [s], in his speech pattern, the tests of imitation and auditory discrimination examined only the [s] sound. However, if the child misarticulated [g], [f], and [s], all three sounds were examined by the tests designed for the investigation. Therefore, the examining procedures in this study were variable in order that the misarticulations of the sample population could be investigated. Due to the kindergarten child's limited attention span at the beginning of the school year, it was decided that a maximum of five misarticulated sounds in any one child's speech pattern would be investigated in the study. If the Spontaneous Picture Articulation Test indicated that there were more than five misarticulated sounds within a child's speech pattern, selection of the test sounds was based upon consistency of error when uttering the sound in the three positions in words. The sounds most frequently misarticulated in all three positions were chosen for the investigation.

Imitative Articulation Tests. Subtest A, the test of imitation of the correct form of a misarticulated sound in isolation, consisted of a series of 12 sounds among which were three correct forms of the child's misarticulated sound placed at random. The child was requested to repeat each sound after the examiner. However, only the child's utterances of the three correct forms of his misarticulated sound were judged.

Sample Subtest A for [s]:

[m]	[p]	[w]	[s]
[æ]	[b]	[s]	[n]
[i]	[h]	[d]	[s]

Subtest B, the test of imitation of the correct form of a misarticulated sound in nonsense syllables, was the Carter-Buck Nonsense Syllable Test.

Sample Subtest B for [s]:

[si]	[isi]	[is]
[sæ]	[æsæ]	[æs]
[sa]	[asa]	[as]

Subtest C, the test of imitation of the correct form of a misarticulated sound in words, consisted of the words previously misarticulated by the child during the Spontaneous Picture Articulation Test. A comparison was made of the child's ability to imitate what he had previously misarticulated spontaneously.

Sample Subtest C for [s]:

scissors	ice cream cone	horse

Auditory Discrimination Tests. The same sounds examined by the tests of imitative articulation were next examined by the tests of auditory discrimination. In each test the child responded when he heard the test sound by clapping his hands.

Subtest D, the test of discrimination of the correct form of a misarticulated sound among vowels, consisted of three correct forms of the child's misarticulated sound placed at random among nine vowels.

Sample Subtest D for [s]:

[a]	[i]	[ʊ]	[s]
[i]	[s]	[a]	[ʊ]
[ʊ]	[a]	[s]	[i]

Subtest E, the test of discrimination of the correct form of a misarticulated sound among acoustically dissimilar sounds, examined the test sound three times among nine dissimilar phonemes. To illustrate, if the test sound was the unvoiced fricative [s], no fricatives or unvoiced sounds appeared in the discriminating sequence. Instead, [s] was examined among voiced sounds of other phonetic categories. Conversely, when a voiced sound was examined, the testing procedure included all unvoiced sounds of different phonetic categories. A testing procedure was designed for each voiced and unvoiced phonetic category represented by the misarticulations of the sample population. Tests were constructed for the following: voiced fricatives, unvoiced fricatives, voiced plosives, unvoiced plosives, and semivowels.

Sample Subtest E for [s]:

[m]	[r]	[s]	[g]
[d]	[s]	[l]	[n]
[m]	[g]	[b]	[s]

Subtest F, the test of discrimination of the correct form of a misarticulated sound among acoustically similar consonants, examined the test sound three times among nine acoustically similar sounds. In this instance, the unvoiced fricative [s] was examined in a sequence of nine sounds which were all unvoiced, fricatives as well as other

phonetic categories. In the event that the test sound was voiced, the discriminating sequence included all voiced sounds.

Sample Subtest F for [s]:

[p]	[t]	[k]	[s]
[hw]	[f]	[s]	[p]
[h]	[s]	[θ]	[ʃ]

Retesting of Spontaneous Speech. The retesting of spontaneous speech occurred seven months after the initial Spontaneous Picture Articulation Test. The 'mild' and 'severe' groups were retested by the same instrument in order to ascertain the amount of speech growth of each child within the two groups. Upon completion of the second testing, the sample population was given a second spontaneous speech score and the amount of speech growth for each child was determined.

Scoring of Tests. The number of sounds which were examined during the testing procedures was variable from child to child. In some instances, only one misarticulated sound had been investigated and in others the maximum five sounds had been examined. Therefore, the score for each child was computed as the percentage of correct responses in the total possible number of responses. The statistical technique utilized for the analysis of the data was the chi-square test.

Results

The amount of articulation improvement made by the 'mild' and 'severe' groups in a seven-month period without the utilization of speech therapy was significant at the .001 level of confidence. In both the 'mild' and 'severe' groups there was a general degree of improvement. However, the 'mild' group showed more consistent speech growth, whereas the most 'severe' children indicated that some sound development was taking place but not at as high a level of achievement as that of the 'mild' group during the intervening seven-month period.

Group Comparisons of Imitative Articulation and Auditory Discrimination Abilities. The 'mild' group was consistently superior to the 'severe' group in ability to imitate the correct form of their misarticulated sound/sounds in all tests of imitation. The 'mild' group's superior imitative ability in imitation of the test sound in isolation was significant at the .05 level of confidence; imitation of the test sound in nonsense syllables was significant at the .001 level of confidence; and imitation of the test sound within words was significant at the .01 level of confidence.

In the tests of auditory discrimination the 'mild' group was found to have significantly greater ability in discrimination of the correct form of a misarticulated sound/sounds among vowels, (significant difference at the .05 level of confidence), and discrimination of the test sound among acoustically dissimilar sounds (significant difference at the .01 level of confidence). There was no significant difference in the abilities of the 'mild' and 'severe' groups in discrimination of the test sound among acoustically similar sounds. This task appeared to be of a perceptual nature that was beyond the abilities of kindergarten children. Both groups, 'mild' and 'severe,' had considerable difficulty with this test item.

Prognostically Significant Test Items. One testing procedure was found to be prognostically significant for the 'mild' group. The ability to imitate the correct

form of a misarticulated sound in words was prognostically significant at the .01 level of confidence. Two of the test items were found to have prognostic significance for the 'severe' group. The ability to imitate the correct form of a misarticulated sound in nonsense syllables and in words was prognostically significant for both items at the .05 level of confidence. The auditory discrimination tests designed for this study were not found to have predictive value that was statistically significant for either the 'mild' or 'severe' groups.

Discussion

The results of this study suggest that the speech clinician may utilize the imitation of words and nonsense syllables as prognostic tools. If a kindergarten child can imitate the correct form of his misarticulated sound in words and nonsense syllables, correct production of the sound would appear to be possible within a seven-month maturation period. Thus, kindergarten children who can imitate correctly need not be enrolled in the speech clinician's frequently heavy case load.

This study supports the prognostic findings of Carter and Buck in that imitation of nonsense syllables has statistically significant predictive value. Their study was made of first-grade children and the present study found similar results at the kindergarten level.

The Carter-Buck (*2*) and Snow-Milisen (*9*) studies revealed that there is significant improvement in articulation test results when responses are imitative rather than spontaneous. This study corroborates their finding that the most accurate method of articulation testing is by spontaneous speech, as the population indicated significantly superior ability in imitation. It appears that the spontaneous responses to pictures indicate more adequately the child's present speech performance than imitative testing procedures which present the correct auditory stimulus for duplication.

The investigation endorses the findings of others (*4, 8, 11, 13*) who have suggested that children with articulatory problems have inferior ability in auditory discrimination. The children in the 'severe' group had significantly inferior ability in discriminating the correct form of the misarticulated sound/sounds in the tests of auditory discrimination.

Although the study did not indicate that auditory discrimination had prognostic value, it appears that the 'severe' group's inferior ability highly supports the necessity of a structured program of auditory discrimination within the framework of treatment of articulation disorders. The inferior ability of the 'severe' group was based upon the inability to discriminate a misarticulated sound in isolation. It appears that children who have 'severe' articulatory defects could profit from strong stimulation of the sound in isolation prior to the presentation of the sound in the complicated configuration of words.

Summary

A Spontaneous Picture Articulation Test was administered to 300 kindergarten children and was scored according to the Wood Articulation Index. On the basis of scores and consistency of errors, the sample population of 50 children with 'mild' articulatory problems and 50 with 'severe' articulatory problems was selected.

Tests of imitation and auditory discrimination were presented to the 100 children selected. Tests of imitation included ability to imitate the correct form of a misarticulated sound in isolation, nonsense syllables, and words. Tests of auditory discrimination included ability to discriminate the correct form of a misarticulated sound among vowels, acoustically dissimilar sounds, and acoustically similar sounds. A retest of spontaneous speech was made seven months later. During the intervening period both groups made highly significant gains in speech growth without the utilization of speech therapy. The ability to imitate the correct form of a misarticulated sound in words and nonsense syllables had prognostic value for the sample population. The auditory discrimination tests designed for this study were not prognostically significant. The kindergarten children who had 'mild' articulatory defects could imitate and discriminate the correct form of a misarticulated sound with greater proficiency than the children who had 'severe' articulation defects.

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Speechreading of Various Speech Materials

• *John B. Brannon, Jr.*

Recently, various types of speech materials have been subjected to analysis in experiments involving speechreading, or lipreading. The Utley Lipreading Sentence Test (*6*), for example, has been examined as to item difficulty and capacity to differentiate good from poor lipreaders (*2*). In addition to sentences, phonemes and words isolated from context have been included as stimulus materials in experimentation. In such experiments, unskilled as well as skilled lipreaders have served as subjects. O'Neill (*5*) found that persons with no previous instruction in speechreading could lipread quite readily when the stimuli were spoken vowels and consonants. Brannon and Kodman (*1*) reported that there was little difference in the performances of skilled and unskilled lipreaders in the visual identification of monosyllabic words, whereas the skilled group greatly excelled the unskilled group in lipreading sentences. The list of words involved in the latter experiment was List 6, Harvard PB-50 series (*4*).

Clinicians engaged in speechreading instruction or combined auditory-visual training in the discrimination of speech would find it advantageous to know the relative difficulty of certain speech materials. Nearly every clinic engaged in aural rehabilitation has on hand such speech materials as the Utley Lipreading Sentence Test, spondee words, and phonetically balanced (PB) words. The following experiment was designed to provide clinicians with usable information concerning these materials.

Materials

Test A, Sentence Test. The Utley Lipreading Sentence Test, Form A (*6*), which consists of 31 short sentences (125 words) commonly used in conversation, was employed as one measure of speechreading skill. One point was given for each word correctly recorded on mimeographed answer sheets.

Test B, Monosyllabic Word Test. Fifty monosyllabic words were selected from the lists developed at Harvard which are known as the PB-50 series (*4*). Since previous knowledge (*1*) suggests that visibility of the total movement form is the best available cue in the visual identification of PB words, selection of items for this test was made on the basis of six categories of visibility. Only the consonantal elements of the PB words were considered in developing the six categories. Consonant phonemes were combined with either vowels or diphthongs. Among the 50 selected words, consonants and vowels (or diphthongs) were related in the following ways: CV, 15 words; VC, five words; CVC, 19 words; CCV, one word; CCVC, four words; CVCC, four words; CCVCC, one word; and CCCVC, one word. The visibility

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categories were based on the place of articulation of the consonants, with the consonants produced at the front of the mouth being considered more visible than those produced farther back. The categories were:

I. No consonant elements clearly visible. Five words like *key* were selected for this category. Phonemes included were alveolars, velars, and glottals.
II. One consonant highly visible, one not visible, 10 words. One such word was *book*. Phonemes included as highly visible were bilabials, labiodentals, linguadentals, and the glide /w/.
III. One consonant moderately visible, combined with a vowel or diphthong. Four words like *say* made up this category. The following phonemes were considered to be moderately visible: /s/, /z/, /ʃ/, /tʃ/, /dʒ/, /r/, /l/, /j/.
IV. One consonant highly visible, combined with a vowel or diphthong, 10 words such as *way*.
V. Two consonants visible, 10 words. An example is the word *with*.
VI. Three consonants visible, 10 words. Examples are *wasp* and *splash*.

The 50 words of Test B were randomized for presentation. Five practice items preceded the test proper. It was hypothesized that there would be more correct identifications of the PB words in Category II than in Category I, more correct identifications in Category III than in Category II, and so on. In other words, the number of correct identifications will gradually increase from Categories I to VI, assuming that factors other than visibility do not enter in to confound the data.

Test C, Spondee Word Test. Ten words were chosen from the Harvard lists of spondee words, which are disyllabic words with equal stress on each syllable, such as *baseball*. Five were chosen because they contained highly visible consonants, and the remaining five contained elements of lesser visibility. The hypothesis entertained was that there would be significantly more correct identifications for the words containing consonants of greater visibility than for those containing consonants of lesser visibility.

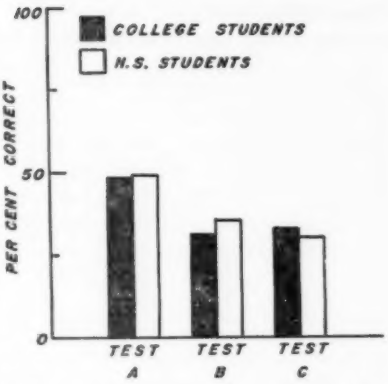

FIGURE 1. Mean percentage of correct identifications by 45 college and 20 high school students for three speechreading tests: A, words in sentences; B, PB words; and C, spondee words.

SUBJECTS

A total of 65 subjects were obtained from a senior psychology class at Henry Clay High School, Lexington, Kentucky, and from psychology laboratory classes at the University of Kentucky. The 45 college students drawn from the laboratory classes had a mean age of 25.2 years and range of 17-49 years. The 20 high school students had a mean age of 17.4 years and a range of 16-21 years. The age range of the total group was 16-49 years with a mean of 22.8 years. There were 22 male and 43 female subjects.

TABLE 1. Relative difficulty in the visual identification of 50 selected PB words.

Word	*Word Structure*	*% of Subjects (N = 65) Identifying*	*Rank*
show	CV	83	1
with	CVC	73	2
there (their)	CVC	71	3
what	CVC	69	4
though	CV	66	5
up	VC	65	6
off	VC	62	7
wasp	CVCC	60	8
say	CV	55	10
they	CV	55	10
splash	CCCVC	55	10
smooth	CCVC	54	12.5
where	CVC	54	12.5
way (weigh)	CV	52	14
them	CVC	49	15.5
farm	CVCC	49	15.5
smart	CCVCC	46	17
of	VC	45	18.5
he (bee)	CV	45	18.5
we (wee)	CV	42	20.5
through (threw)	CCV	42	20.5
have	CVC	40	22
day	CV	35	23
move	CVC	34	24
smile	CCVC	29	25
oil	VC	28	26.5
shove	CVC	28	26.5
please	CCVC	25	28.5
go	CV	25	28.5
rooms	CVCC	23	30.5
chew	CV	23	30.5
slip	CCVC	20	32
ate (eight)	VC	19	33.5
book	CVC	19	33.5
key	CV	17	35
new (knew)	CV	15	36
poor (pore, pour)	CVC	12	37
dumb	CVC	11	38.5
him	CVC	11	38.5
my	CV	9	40.5
wire	CVC	9	40.5
deaf	CVC	3	42
thing	CVC	3	43
bathe	CVC	2	46
give	CVC	2	46
bells	CVCC	2	46
wet	CVC	2	46
hang	CVC	2	46
thin	CVC	0	49.5
mew	CVC	0	49.5

PROCEDURE

All three speechreading tests were administered in the classroom setting in the following order: Test A, sen-

tences; Test B, PB words; and Test C, spondee words. During the speechreading tests, a loud sawtooth masking noise estimated to be 70 db SPL was delivered through a loudspeaker (Bell Disc Recorder) into the classroom to rule out the possibility of any other sound reaching the subjects' ears. The talker stood before the class to speak the stimulus materials in a faint whisper, being careful not to exaggerate his lip movements and making every effort to speak naturally at normal speed. To mobilize the viewers' attention, the talker held up a 3" x 5" card displaying the number of the item immediately preceding the presentation. Subjects wrote their responses on mimeographed answer sheets, making a response to each item.

Results

Speechreading Test Scores. The mean scores on the three speechreading tests are presented in Figure 1. On Test A, words in sentences, the college students correctly identified a mean of 48.5 per cent of the words (60.6 words out of 125), while the high school students averaged 49.8 per cent (62.2 words out of 125). On Test B, PB words, the college group identified a mean percentage of 31.3 per cent (15.6 words out of 50). The high school group had a group mean of 35.1 per cent (17.5 words out of 50) on Test B. For spondee words, Test C, the college group, identified 32.7 per cent (3.2 words out of 10). The high school students had a mean of 30.5 per cent (3.0 words out of 10). Summarizing, as shown in Figure 1, the performances of the two groups were nearly identical. This result is supported by a difference of only 1.8 per cent in the composite scores for the two groups.

When words were presented in sentences, both groups identified nearly 50 per cent of them, but they were able to identify only 30-35 per cent of isolated words. The amount of context available was thus a great help, although this result must be interpreted with caution, since the words in sentences were not identical in their characteristics to the isolated words.

Relative Difficulty of PB and Spondee Words. In Table 1 the selected PB words are listed in the order of relative difficulty of visual identification. For example, 83 per cent of all subjects (N = 65) were able to identify correctly the word *show*. Zero per cent of the subjects identified the word *mew*. After the words were ranked in order from least to most difficult, an analysis of the data was made by means of the chi-square technique to determine whether the observed number of correct identifications falling into each

Table 2. Observed numbers of correct and incorrect identifications of PB words for 65 subjects.

Responses	*Visibility Categories*							
	I	*II*	*III*	*IV*	*V*	*VI*	Σ	Σ/*n*
Correct	73	103	123	286	260	241	1086	.33
Incorrect	317	547	137	364	390	409	2164	.67
Σ	390	650	260	650	650	650	3250	
Σ/*n*	.12	.20	.08	.20	.20	.20		1.00

TABLE 3. Relative difficulty in the visual identification of 10 selected spondee words.

Word	*% of Subjects (N = 65) Identifying*
baseball	82
whitewash	55
mushroom	43
sidewalk	43
hotdog	31
toothbrush	28
hothouse	23
inkwell	8
mousetrap	6
pancake	2

of the six categories of visibility was significantly greater than chance expectancy. Table 2 presents the observed total number of correct and incorrect responses within each visibility category. The over-all chi square of 199.90 was significantly greater than chance expectancy at less than the .01 level ($df = 5, p < .01$). The differences between the categories in percentage of correct identifications were as follows: I, 19%; II, 16%; III, 47%; IV, 44%; V, 40%; and VI, 37%. Thus, the subjects had a great deal of difficulty in identifying words in categories I and II and less difficulty in identifying words in categories III-VI. Out of the first 25 words listed in Table 1 (least difficult), 20 per cent were found in categories I-III, and 80 per cent in categories IV-VI. Thus, words of lesser visibility were generally more difficult to lipread. However, there was not a great deal of difference between the ease of identification of words in categories IV, V, or VI. That is, the addition of another visible consonant did not seem to aid in visual identification and perhaps only complicated the process.

Concerning Table 3, listing spondee words, a similar chi-square analysis was undertaken to determine whether the observed number of correct responses in each category of visibility could have reasonably occurred by chance. The chi-square value was 40.29, $df = 1$, which was significant at the .01 level. The predicted outcome, that spondee words containing a larger number of visible elements would be more easily identified, was supported by the data. The mean percentage of subjects identifying the five words of greater visibility was 42.8 per cent, whereas the figure for the five words of lesser visibility was 21.4 per cent.

Speechreading Ability and Sex. The composite scores of 22 male and 43 female subjects were compared by a nonparametric test, White's Rank Test (*3*, p. 420), to determine if the two sets of observations were from a common population. The range of composite scores for females was 33-124 words, mean 81.7. The range for males was 48-111 words, mean 78.2. The obtained z score was .8871, which did not meet the required level of significance. It was therefore assumed that there was no difference in the speechreading ability of the male and the female subjects.

SUMMARY

Three types of speech materials were presented for visual identification to 65 high school and college students: the Utley Lipreading Sentence Test, Form A; 50 selected PB words; and 10 selected spondee words. The PB words were selected on the basis of six categories of visibility related to the phonetic composition of the words. In like man-

ner, five spondee words were chosen which contained phonetic elements of low visibility and five containing elements of high visibility. The following were the major outcomes: (a) The subjects identified approximately 50 per cent of the words in the Utley Sentence Test, Form A. (b) The subjects identified a mean percentage of approximately 35 per cent of the 50 selected PB words. Words containing consonantal elements of greater visibility were more easily identified. However, the addition of one or two visible consonants did not simplify the identification process. (c) Approximately 30 per cent of the spondee words were correctly identified. Those words containing consonants of greater visibility were more easily identified. (d) Males and females did not differ in speechreading ability.

Tables listing the PB and spondee words in order of difficulty for speechreading are included for use by clinicians in training aurally handicapped individuals.

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Social Participation Levels of Nonlanguage Children

- *Freeman McConnell*
- *Margaret McClamroch*

A growing awareness of the complexity of hearing problems in children has emphasized the need for more multidimensional appraisal techniques. To differentiate the central dysacusic from the hypacusic child requires not only an accurate evaluation of the peripheral hearing ability, but also a knowledge of behavioral patterns of children with and without pathological involvement as these relate to the child's auditory intake and other facets of personal-social development. Lowell (*1*) has reported research in which the observation rating technique was used to assess social participation as a means of obtaining information useful for diagnostic differentiation between groups of children with specific kinds of auditory disabilities.

Parten and Newhall (*3*, p. 509) used the term 'social participation' to denote the degree of participation in social acts, which for the preschool child has been interpreted to be a combination of play and communication. For the young child much of the need for communication symbols, or oral language, arises from play, and thus play and communication together enhance the child's degree of social participation. Play can be said to be the business of the child's life, albeit more limited in scope when a language handicap exists. Communication, or perception and expression of thought, while dependent upon the individual's needs and environment, also assumes adequate functioning of the sensory receptors and the central nervous system. Nursery school programs for hearing handicapped children usually are planned with the stated purpose of providing experiences to stimulate interaction through play with other children, which in turn is expected to develop motivation for communication (*2*). The adequacy of the child's social participation functioning will, in consequence, be influenced by the way in which play and communication are developed.

The writers of the present study undertook to compare, through observation ratings, the social participation of preschool children with two types of auditory disorders, central dysacusis and hypacusis. Additional information was sought concerning the effects, if

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any, of previous nursery training and chronological age.

Plan of Study

Subjects. The 16 subjects were selected from a special preschool program for acoustically handicapped children in an audiology and speech center. Diagnostic classifications were based on otologic, pediatric, neurologic, psychologic, and audiologic evaluations. The two groups included 11 children with central dysacusis and five hypacusic children, all of whom were of normal intelligence but sufficiently handicapped auditorially to prevent the acquisition of oral language in the normal manner. The median hearing level for the dysacusic group as determined by free-field subjective audiometry was 87 db *re* normal (500–2000 cps average) and 83 db for the hypacusic group. Median hearing levels by GSR audiometry for the dysacusic children were: right ear, 10 db; left ear, 10 db (500–2000 cps average); and for the hypacusic group: right ear, 57 db; and left ear, 62 db. The children ranged in age from two years, seven months, to six years, two months. The length of time they had been exposed to special nursery and preschool deaf training ranged from two to 12 months.

Rating Scale and Observers. Parten's (*3*, pp. 512-513) description of social participation was based on observations of children in an unstructured nursery school situation, in which it was found that certain combinations of play and communication existed at varying levels of complexity. She listed six combinations of play and communication, increasing in complexity from one combination to the next:

Level 1. The child who plays neither with other children nor by himself also does not express himself to anybody. This type of social participation, the most primitive level, is classified as 'Unoccupied Behavior.'

Level 2. 'Solitary Play' pertains to the child whose activities are entirely restricted to his own toys and play without interaction with other children even though in close proximity.

Level 3. 'Onlooker Behavior' describes a child's attentive attitude toward other children's activities, with some interspersed comments or questions.

Level 4. 'Parallel Play' is carried on with the same type of toys nearby children are using but is entirely independent in the way it is carried out.

Level 5. 'Associative Play,' designating children playing together, includes an exchange of toys and interaction in communication. Although a 'give and take' attitude is involved, there is no apparent group purpose, and each child is self-directed.

Level 6. The highest level in the scale, 'Cooperative or Organized Supplementary Play,' is highly organized and cooperative, established and maintained by the child's communicative ability.

Application of these criteria to distinguish the various levels of social participation for the 16 subjects was the fundamental basis for the present study.

The observers were persons who either had some familiarity with principles of child development through college courses or had had some student practicum experience with children in a speech and hearing clinic. They were not aware of the two diagnostic classifications which had been used in audiologic evaluation of the children.

TABLE 1. Summary of comparison of median total summed scores, Mann-Whitney *U* values, and probability levels obtained from Social Participation Scale used with two groups of preschool subjects.

Subjects	*N*	*Median Total Summed Score*	*Mann-Whitney U*	*P*
Divided on Basis of Audiologic Diagnosis				
Hypacusic	5	510	19	.10
Dysacusic	11	461		
Paired by Chronological Age				
Hypacusic	5	510	9	.27
Dysacusic	5	461		
Paired by Length of Training				
Hypacusic	5	510	3	.02
Dysacusic	5	423		
Divided on Basis of Chronological Age				
Older	8	499	26	.29
Younger	8	479.5		
Divided on Basis of Length of Training				
Longer Amount of Training	8	497	22	.16
Shorter Amount of Training	8	456.5		

There were six observers in all, three undergraduate females with speech pathology training and three male graduate students, one in speech pathology and two in psychology.

Procedure. The observers familiarized themselves with the Parten social participation scale and a trial observation period was held preliminary to the four weeks of rating sessions. The 10-minute observation periods, two by each of the six observers, totaled 12, or 120 minutes, for each subject. On any one day an observer rated not more than three children in a 10-minute session for each. Only one investigator observed a child at a time.

Each session was broken down into 10 one-minute observations. Using the six levels of the Parten scale, the observer determined the highest level of activity which occurred in each one-minute interval. If, for example, a child played at Levels 3 and 4 in a one-minute interval, the rating for that interval was 4.

Because the children were in two nurseries divided on the basis of age, they were observed in age groups according to their placement. All observations were scheduled at a time in which the children were participating in an unstructured classroom environment. Though there were teachers in the room, they were instructed not actively to require the attention of the children.

The ratings of the levels obtained during the observations were summed for each 10-minute period, and all 12

observational sums for each child were added to obtain his total sum. The final sums were ranked from one to 16 to include the range of lowest to highest total sums.

Results

The data were analyzed statistically to determine the significance of the difference in social participation when a comparison of the children was made on the basis of (a) audiologic diagnostic categories, (b) the two diagnostic classifications when subjects were paired by chronological age, (c) the two diagnostic classifications when subjects were paired by nursery school experience, (d) age alone by dividing the total number of children into a younger and an older half, and similarly, (e) length of time spent in training. The Mann-Whitney U Test (*4*, pp. 116-118) was used in each of the statistical comparisons. The results are summarized in Table 1.

Discussion

It appears that for the present sampling of nonlanguage children the level of social participation functioning is not a clearly defined distinguishing characteristic between the two diagnostic classifications unless length of training is taken into account. The one significant difference between the hypacusic and central dysacusic groups occurred for the comparison in which the subjects were matched with respect to the amount of previous acoustic nursery experience. This difference was in favor of the hypacusic group. It may be noted, also, that the median total summed scores were somewhat higher for the hypacusic children in each of two other comparisons with the central dysacusic group, although differences were not statistically significant.

When age was a variable, there was no observable difference in complexity of social participation skill between an older and younger grouping of both diagnostic groups combined; nor was there a difference, as noted above, between diagnostic divisions when there was a pairing on the basis of age. These findings suggest that for such children substantial increase in social participation level does not necessarily accompany increasing physical maturation, as is generally true of the normal hearing child. Rather, the two factors of diagnostic classification and extent of nursery school training appeared to exert much more important influences on the social participation development of these two groups of nonlanguage children. The finding that differences between the two groups were not marked, for the most part, suggests that the central dysacusic children may be expected with special training to achieve social participation growth, even if less readily than the hypacusics.

Summary

The social participation levels of two groups of nonlanguage children were studied by means of the observation rating scale. The 16 subjects selected from a special preschool program for acoustically handicapped children included 11 children with central dysacusis and five hypacusic children. Diagnostic classifications were based on otologic, pediatric, neurologic, psychologic, and audiologic evaluations.

Each child, observed at intervals over a period of four weeks, received 120 rating scores denoting his highest

level of social participation in a given one-minute period. Six trained observers rated the children in 12 observation sessions of 10 minutes each. The data obtained were submitted to statistical analysis to yield information regarding the influence of audiologic diagnostic category, age, and amount of nursery school experience.

The results of the study, though including only a limited number of subjects, suggest that the clinician may not anticipate marked differences in social participation to exist in children representing the two diagnostic classifications of hypacusis and central dysacusis. Furthermore, maturation through increase in chronological age in either of the two auditory types under study did not facilitate higher functioning levels of social participation. The children with peripheral hearing impairment in this sampling, however, apparently derived benefit from nursery training which enabled them to develop complexity of social participation skill more rapidly than their matched counterparts with non-peripheral hearing impairment.

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Mechanisms of Compensation for Hearing Loss: Theories and Research in the Soviet Union

• *Boris V. Morkovin*

In brief, the Soviet approach to the problem of compensation for hearing loss is characterized by a sense of urgency and national responsibility for the habilitation of hearing-impaired and other handicapped children. This attitude springs from (a) the Soviet viewpoint that the deficiencies of the child can be compensated for and his resources developed most effectively if he is given early training under scientifically controlled conditions which assure the most favorable possible environment and (b) the appalling loss of population during the Civil War and the two World Wars, which, coupled with the unprecedented tempo of the Soviet industrial revolution, has resulted in a spiraling need for habilitation of all possible manpower.

The programs of habilitation are governmentally organized on many fronts: (a) efforts to conserve hearing and detect early hearing loss, through regular examinations in public dispensaries and speech-hearing clinics; (b) provision of prophylaxis and hearing aids at government expense; (c) research covering all aspects of hearing loss – neurophysiological, audiological, psychological, and educational.

The state educates hearing-impaired and other handicapped children, from age of one, in special nurseries, kindergartens, and schools. This special training is coordinated with that of the regular schools so that hearing-impaired children are able to join the public schools at some level depending upon the degree of their affliction, whether they are sufficiently prepared, and their mastery of speech and language. At the present time, several hundred deaf and hard of hearing students are attending institutions of higher learning on a competitive basis and many of them have already achieved success as engineers, scientists, and other professional workers.

There is no shortage of well-trained teachers of the deaf and hard of hearing children. These teaching positions are sought after because of their comparatively high financial and social status. Teachers receive salaries during their training and internship and are encouraged to do further study and research in their fields.

Basic interdisciplinary research is being conducted on the nature of deafness and its diagnostic, therapeutic, and educational aspects at various investiga-

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tory institutions, such as (a) the Moscow Institute of Defectology, under the auspices of the Academy of Pedagogical Sciences, and (b) the Institute of Otolaryngology, under the auspices of the Academy of Medicine. The state pedagogical institutes train teachers and conduct research in cooperation with the institutes of defectology.

The theories and findings of the research institutions have a direct influence upon the practice of teachers, medical and audiological personnel, as well as upon parents of hearing-impaired children. In the Soviet Union great emphasis is placed on the education of parents of hearing-impaired children; the parents cooperate closely with schools in developing good habits in their children and expediting their successful adjustment to the school environment.

General Adaptational Theory

According to Pavlovian theory (*6*, pp. 45-46), human beings are integrated organism systems which not only possess the ability to adapt to their milieu but are also self-regulatory, self-restorative, and self-perfecting. These remarkable attributes are outgrowths of the creative function of the central nervous system.

This Pavlovian theory is similar to Cannon's concept of homeostasis (*5*), both theories ascribing to the organism a tendency to maintain a constant state of equilibrium in its interaction with the environment (*3*, pp. 73-108). Essentially, compensation for a handicap is the substitution of an alternate activity for a lost or impaired function. It is providing a detour, as it were, around the lesion by utilizing other potentialities within the organism.

However, this process is not automatic, nor is it independent of the external world. It can be realized and reinforced only by an orderly process of continuous interaction between the organism and its external environment (*18*, p. 17). In a controlled educational situation designed to bring about effective interaction between human organisms, the early mastery of communicative language is necessary.

The potentialities of a hearing-impaired child cannot be realized until he is involved as a social unit in the communicative process and until he participates in the collective experiences of family, school, play, and community groups. Group dynamics play an important role in habilitation through education.

The compensatory process, effectively developed, involves the entire psychophysiological organism: growth in auditory discrimination, in sensory substitution, in personality adjustment. According to Soviet neurophysiologists, this process may transform the functional pattern of the central nervous system and may change its level of excitability and lability.

According to Anokhin's theory (*6*, p. 53), successful compensatory reorganization of an afflicted organism recombines formerly fixed intracentral processes, especially in the cortex. Invigorated environmental relationships release a new flow of qualitatively and quantitatively different afferent impulses to the central nervous system; new functional intracentral relationships are thereby created (*6*, p. 63). The tonus and mobility of the nervous system thus heightened facilitate the transition from one state of nervous activity to another and elicit the par-

ticular reaction required by the altered environmental condition or activities.

Compensatory Significance of Language

Mastery of language (i.e., Pavlov's second signal system [*20*, pp. 20, 88-89]) elevates hearing-impaired children to a developmental plane which enables them to enter personal and group relationships (*12*). By means of language the myriads of stimuli which confront the organism can be differentiated, generalized, and classified into concepts. Experience is thus organized and one becomes oriented to his surroundings; conceptualization develops memory, recall, and conscious behavior (*6*, p. 35, *1*, pp. 516-517) and gives the child a tool which enables him to become an active part of his environment through acculturation and socialization. In view of the signal role ascribed to the early acquisition of language, the Moscow Institute of Defectology initiated a long-term educational study of the methods of teaching language to preschool deaf children.[1]

In the successful training of a hearing-impaired child, language and sensory training must be combined so as to supplement each other. The two devices are interdependent: (a) In order to speak and to speech read, a child must learn to discriminate among sounds to discern visual counterparts of sounds on the lips of the speaker. (b) At the same time, the increase of familiar words in meaningful situations allows pupils to recognize contextually incomplete sounds and lip movements.

Verbal discrimination and improvement in articulation and pronunciation are created by the knowledge of phonemic composition in words and of grammatical word sequence. Conversely, it was shown experimentally by Neiman at the Moscow Institute of Defectology that the command of language is a significant factor in sound discrimination of the severely hard of hearing children (*18*, p. 57). He found that, although both experimental and control groups had the same audiograms, the children with language made significantly better progress in auditory discrimination than children who did not have a command of language.

Sensory Training

An essential role in sensory training is played by the cortical aspects of the sensory organs. It is the cortical parts of the sensory organs (the 'analyzers,' in the terminology of Pavlov [*20*, pp. 14 ff.]) which constantly interact with their peripheral ends and thus analyze, synthesize, and interpret the environmental stimuli.

Auditory training involves the intrasensory (or 'intra-analyzer') mechanism in which both the peripheral and central parts of the acoustic analyzer are involved (*1*, pp. 67-71). The cortical parts are activated by concentrating the attention of a severely hearing-impaired child to the formants of the sound-spectrum which hitherto had not been noticed, as, for example, in the lower formants in the sounds [ɪ] and [i] (*18*,

[1] A partial report of this research was published in the *Volta Review* (*15*). Blind-deaf Olga Skorokhodova, Russia's counterpart of Helen Keller, ascribes what she calls her *humanization* process to her mastery of communicative language (*21*, p. 4). This experience not only 'humanized' her, but was highly instrumental in her rise to intellectual and professional heights as an author, professor, and researcher at the Moscow Institute.

p. *63*). In multisensory training the visual, kinesthetic, auditory, and tactile cues are cortically analyzed and synthesized into speechreading with the use of intersensory ('inter-analyzer') mechanisms.

For use in a multisensory-rhythmic type of training, Soviet defectologists have introduced an electro-magnetic apparatus called the *photo-vibrophone*. The use of a recorder enables the deaf to perceive the rhythmic contours of words and phrases, as well as the pauses between words. Subjects are able by means of the apparatus to apprehend verbal rhythm simultaneously from different senses: (a) by audition, they hear from an amplifier; (b) visually, they see light flashes which occur at the same time as the accented rhythms; (c) kinesthetically, upon seeing each accented flash of light, they respond by pressing a button (*18*, pp. 83-85).

Brain Activation

Auditory and multisensory training connected with meaningful situations heightens the analyzers' *cortical tonus*, making a closer sound analysis possible. While the absolute threshold remains unchanged, the threshold of sound discrimination is lowered. Underlying the phenomenon of attention is what Soviet psychologists and neurophysiologists call the *orienting reflex*. Basically, it is an unconditioned alerting reflex, which responds to novel stimuli or to environmental changes; it creates a new focus of excitation in the cortex.

The orienting reflex is one of the organism's most refined adaptive mechanisms for meeting the impact of its ever-changing environment. This reflex is essential to survival (*25*, pp. 193-194). It conserves the organism's energy by circumventing detailed reactions to the masses of unessential, irrelevant, or insignificant stimuli which constantly impinge upon the organism. Furthermore, it helps to prevent casual reinforcement of overspecialized associations. If a stimulus proves inconsequential to the organism, the orienting reaction is inhibited, and its external and internal manifestations are extinguished (*13*).

Some Soviet psychologists (*22*, p. 182, *20*, pp. 86-87, *27*, pp. 69-71) interpret the orienting reflex as involuntary attention in its primitive stage. By conditioning, the orienting reflex eventually develops into *voluntary attention*, the latter being characterized by conscious, purposeful behavior (*23*, p. 184).

Orienting Reflex Research. Because the orienting reflex affects the entire organism, it has been the object of much research in various Soviet clinics. Luria and Sokolov and their collaborators in the Moscow Institute of Defectology use registered manifestations of the orienting reflex as indices of normal and pathological states. The different types of sensory disturbances and their complications can be studied objectively by the recording of vascular, skin-galvanic, bio-electrical brain impulses and other manifestations of the orienting reflex, as shown by Gershuni (*8*).

In severely hearing-impaired persons, the orienting reflex to sound stimuli is poorly expressed in somatic and autonomic manifestations, whereas the orienting reflexes of these same persons' intact analyzers are expressed quite clearly. For example, Novikova and Sokoliansky established a stable orienting reflex in deaf-blind subjects through

touch, which aroused the subjects' predominantly active skin analyzer (*24*, p. 47).

On the basis of the recording of orienting reflex manifestations by electrophysiological and audiometric techniques, an objective differentiation and classification of hearing-impaired children become possible. Such classification makes it possible for these children to receive more specialized treatment, and education in more homogeneous groups.

Orienting Reflex Components. The motor manifestations of the orienting reflex involve alterations in the muscular tonus of different parts of the body. Examples of such manifestations are turning the body, head, or eyes; the animal's pricking up of his ears; or other movements which accommodate the organism for best perception.

Other components of the orienting reflex occur simultaneously with these motor responses. These are reactions of the autonomic nervous system, which may consist of (a) such measurable changes in the cardiovascular system as dilation of temporal blood vessels and constriction of finger vessels; (b) changes in the respiratory system; (c) such a skin-galvanic reflex as lowered skin resistance; (d) metabolic change, such as increased or decreased adrenalin; and (e) changes in the analyzers' adaptational mechanisms, such as pupil dilation. These autonomic reactions have a function, as components of the orienting reflex, in regulating the receptor system and insuring optimal perception of the external stimulus, and thus the maximal effect of a given stimulus upon an organism (*20*, pp. 92, 94, *1*, pp. 61 ff.).

The range of usable auditory perception can be established by plethysmographic differentiation (*18*, pp. 27-28) between the *orienting* (at the absolute threshold) and *defensive* reflexes (at the threshold of discomfort). Vascular manifestations of the orienting reaction to sound, according to Sokolov (*23*, pp. 204-206, *24*, p. 43), have opposite curves on the oscillogram, viz., *constriction* of blood vessels in the finger, and simultaneous *dilation* of blood vessels in the head (temporal and frontal arteries). Sokolov relates this dilation to the increased sensitization and the heightened reactivity of the sensory organ (*24*, p. 16). Conversely, defensive reactions to sound, on the level of pain, exhibit parallel curves, viz., registering constriction of vessels in both head and finger. This constriction is associated with the organism's response of fright or withdrawal.

Objective indices such as these are diagnostically important in the observation of recruitment for loudness (*18*, p. 27).

Sokolov and other Soviet scientists associate the orienting reflex with the brain's activating system, the *reticular formation.* The reticular formation is located in the brain stem and thalamus. As a mechanism of the orienting reflex, it heightens the tonus of the sensory analyzing system (*1*, p. 75).

Western neurophysiologists, such as Moruzzi and Magoun (*17*), Jasper (*11*), Granit (*9*), and others who investigated the reticular formation and established its activating function, carried on their research independently of Soviet studies of the orienting reflex made by Beritov, 1948 (*4*, *23*, p. 12) and others. However, the investigations of United States and Soviet scientists appear to reinforce each other.

Conditioning and Feedback

The orienting reflex is considered to be the dynamic core of the conditioning process, a built-in motivating power. Active conditioning involves the entire organism in its process of adaptation. If the cortex is inhibited, the conditioned response is also inhibited and takes place only with difficulty and without stability.

To compensate for hearing deficiencies, for example, a child's cortical activities must be sparked by attention; this, in turn, evolves from the orienting reflex through conditioning (*20*, pp. 56-57). The process of speech imitation originates with the development of the orienting reflex and involves an extension of the classical stimulus-response mechanism.

In addition to the generally accepted three links of the reflex arc (receptor, central nervous system, and effector), the self-correction made by the central nervous system involves a fourth link. This fourth link was traced anatomically and physiologically by the Soviet neurophysiologist Anokhin who called it a *return afferentation* (*2*). This afferentation, not unlike the *feedback* of cybernetics (*26*), reports back from the effector the success or failure of the response and the measure of adjustment to the environment, a process which enables the central nervous system to direct the self-correcting actions of the organism (*2*, 7, p. 107, *16*, p. xi).

In auditory and multisensory training, teachers utilize feedback for helping hearing-impaired children to imitate correct sounds and to form a correct pattern of speech organ movements (*28*, p. 333).

In the social situation, the feedback principle is also used in helping these children to learn behavior patterns which are instrumental in their adjustment to society. This interpersonal adjustment assists in the development of conscious cooperation with habilitators throughout the entire compensatory process.

Systemness

It is indeed a major accomplishment when severely hearing-impaired children learn to synthesize and interpret what they perceive and to respond with intelligible speech. Soviet psychologists believe that even though this remarkable accomplishment is difficult it *can* be achieved, thanks to the unique systematizing quality of the cerebral cortex (*6*, p. 68, *20*, p. 157).

This systematizing quality Pavlov called *systemness;* it is the quality of flexibility through which the cortex organizes, generalizes, and synthesizes large complexes of stimuli, sorting them into what the Soviets refer to as *dynamic stereotypes* (*14*). It enables man to grasp whole situations and relationships, and to make appropriate and effective responses.

Systemness is acquired. It is trained and developed through the processes of communication and education. According to Pavlov, it evolves a series of connected mental operations or motor skills.

Dynamic stereotypes underlie all purposeful sensory and motor coordinations. They are the source of man's ability to associate direct sensory experience with word symbols; they are fundamental to his ability to comprehend the meanings of words, and to organize them into logical and grammatical sequence.

Their deficiency makes it difficult

for hearing-impaired children to develop language, to do verbal thinking, and to build problem-solving dynamic stereotypes. In order to correct the particular difficulties of a given child, his teachers must determine, trace, and restore the 'missing links' in his mental operations. This is accomplished by special exercises designed to fill in the child's developmental gaps. Soviet methods of bridging these gaps are devised experimentally (*20*, p. 224).

In order to equilibrate himself to his environment, the hearing-impaired child must acquire a balanced personality. And it is the systemness, i.e., the organizing quality of the brain and its ability to form functional dynamic stereotypes, which are most instrumental in the personality development of such a child (*6*, p. 68).

Defectologists in the Soviet Union emphasize the necessity for combating the total *syndrome of deafness* in habilitating hearing-impaired children. This approach is holistic and developmental. It entails not only the mobilization of the entire physical and psychological potential of the child, but also the systematic organization of all treatment and teaching procedures, including his daily routine, his habits and his skills. The aim of the approach is to enable these children to participate in environmental activities and to function more fully.

The entire personality may become impoverished because of isolation, confusion, and frustration which often occur in the formative periods of an untutored handicapped child's life (*9*). Habilitation, as conceived by Soviet educators, is designed to *rebuild the whole personality* of children, communication being the cornerstone of the program. The teaching of speech and speechreading is not isolated from live communication and personality expression. Based as it is on the philosophy of the whole personality, Soviet habilitation is planned to permeate every aspect of the child's life (*6*, p. 239). The process includes over-all guidance and character development, taking care of each child's particular needs, interests, attitudes, attention span, social relationships, and individual personal problems. All aspects of habilitation are geared to developing in children reaction patterns which are adequate for adaptation to the hearing world.

The need for special personality training of hearing-impaired children is emphasized by Soviet defectologists; such training is central in their rearing and guidance, and is to be distinguished from education per se. The rearing-guidance aspects of habilitation are the responsibility of special counselors. These specialists contact and inform parents, work with teachers and other personnel; guide the child in his personal problems; supervise school, work, recreation, and leisure activities; and encourage growth in personal relationships and participation in group activities.

Discussion

Despite obvious differences in the sociopolitical structures and philosophies of the Soviet Union and the United States and the dissimilarities in some methods of habilitation, research, and practice, there are certain important points in common between the two countries. Both recognize the necessity of (a) dealing with the entire psychophysical organism of a hearing-impaired child in achieving his effective habilitation; (b) interdisciplinary research

and teamwork of all participants of habilitation; and (c) early detection of hearing loss, prophylactic treatment, and early education of the child based on effective oral communication.

Both countries are carrying on basic research in nationally endowed institutions, for example, the Scientific-Investigatory Institute of Otolaryngology and Defectology in Moscow and the Audiological Division of the National Institute of Neurological Diseases and Blindness in the United States (*10*). These institutions also support and foster research in other medical and scientific organizations.

The neurophysiological findings using bioelectrical autonomic and somatic manifestations of reactions of the entire organism to sound and other stimuli have given rise to new methods and techniques in audiology and otolaryngology in both countries. Recent meetings of neurophysiologists and neurochemists of the United States and the Soviet Union at the New York Academy of Science and at the University of California have revealed many areas of agreement in experimental findings. However different some of the techniques and treatments were in the fields of conditioned behavior, orienting reflex, and electrophysiological brain activities, the findings 'coincided almost point by point' (*19*).

Summary

A trend is noted in research and practices of habilitation of the hearing-impaired children in the Soviet Union toward: (a) objective methods in differential diagnosis for locating pathological obstructions to the flow of sound impulses in peripheral and central pathways; (b) greater precision in the classification of hearing-impaired children as a basis for distributing them in different types of classes and schools, for intensive specialized training: (c) early detection of hearing loss or pathological conditions leading to it by systematic examination, prophylactic measures, and treatment; (d) prevention of isolation, frustration, and retardation by an early start in preschool education and development of effective oral communications; (e) combating the whole physical and psychosocial syndrome of deafness through compensation for the child's defect and positive development of his potentialities; (f) coordination of the above measures and leadership in habilitation, research, and practice by scientific investigatory institutes under the auspices of the academies of medicine and of pedagogical sciences; (g) emphasis on education of teachers and parents and close cooperation between them in the development of the hearing-impaired child's personality, habits, and skills.

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Learning Principles and Teaching of Speech Language

- *Ralph L. Shelton, Jr.*
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Recent articles suggest that persons whose work is to teach speech and/or language are becoming more interested in utilizing verified principles of learning in planning and conducting their instruction. Raph (*18*) has discussed the influence of the parent-child relationship on the child's responsiveness to a teacher, and she has pointed out that the teacher may have to consider the student's total drive to achieve satisfaction and security. Low, Crerar, and Lassers (*9*) stress the importance to speech learning of the child's hypothetical need for communication. They structure lessons in a group situation in order to take advantage of this motivational factor.

Consideration should also be given to the utilization of learning principles in reaching specific goals in teaching. Even though debate continues about theoretical learning formulations, agreement exists concerning many principles that may be employed by the teacher. The purpose of this article is to present information on principles of learning and to relate them to the teaching of speech and language. Speech is seen as a means of expressing language orally. It includes initiation of voice and use of the articulators. Language is the message which is expressed (*20*, p. 415). In this paper, interest is on the communicative function of orally expressed language; however, other functions are recognized (*17*, chap. 1).

Van Riper and Irwin (*24*, pp. 105-118) have explained physiological control of voice and articulation in terms of feedback theory, and Miller's work (*13*) suggests that biochemical and surgical procedures may be expected to be used increasingly to prepare certain persons for learning. However, no consideration will be given here to the work that attempts to explain the neurophysiological mediation of learning. Instead, empirically derived principles from the behavior literature will be considered. Greater emphasis will be placed on the stimulus-response-reward approach than on the cognitive theories (*23*, chap. 18).

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Motivation

All behavior has its motives, and organisms tend to vary their activities in response to changed conditions in

their environments (*19*, chaps. 2, 3, and 5). Persons have needs which may be defined as physiological states of deprivation such as are associated with sustained lack of food (*8*, pp. 422-423). The psychological correlate of need is called drive. Drive moves an organism to activity, and drive reduction by resolution of a need reinforces the behavior which led to the reduction. According to Hebb (7, p. 155), the term motivation refers to the problems of what makes an animal active rather than inactive and what makes one form of activity dominant over others. In answer to these questions, Hebb draws attention to biological needs and corresponding drives. He states that drive, a theoretical conception, implies that the processes which determine the animal's level of behavioral activity are separate from the processes that guide that behavior. Thus, as Miller and Dollard (*12*, p. 21) write, a drive impels a person to respond, but cues or other stimuli determine when, where, and how the response will be made. If some one response is followed by reward, the connection between the stimulus pattern (drive plus cues) and this response is strengthened so that the next time the drive and cues are present the same response is more apt to occur.

Not all behavior including speech and language may be seen as drive reducing in that these kinds of behavior do not directly influence biological need. However, speech and language may lead to drive reduction if they are associated with resolution of a need. The human infant may learn that vocalization leads to satisfaction of his needs. Because of this, vocalization comes to reduce drive, and the act of vocalizing becomes rewarding to the child.

TABLE 1. Number of speech teaching techniques reported in use by 58 parents.

Number of Techniques	*Parents Reporting Use of Techniques*
0	7
1	26
2	17
3	5
4	3

REINFORCEMENT

The teacher, who deals with students who already have many acquired drives, is faced not with a vague problem of motivation but with the problem of eliciting and reinforcing the behavior he wishes to develop. He must discover that for which the individual student will work. The presence of motivation or drive is not in itself sufficient to bring about learning. It is reinforcement through drive reduction that determines what behavior will take place. This reinforcement, which even influences future drive, is subject to teacher manipulation and utilization.

From the discussion so far, the assumption might be made that the initiation and development of speech and language is furthered by, if not dependent upon, the rewarding of responses. As indicated above, some psychologists have explained learning as resulting from reduction of a drive state by a sequence of response and reward. Drive reduction results in reinforcement. Speech and/or language learning might involve, for example, a stimulus such as a speech sound, a response such as the learner's repetition of that sound, and a reward in the form of maternal or teacher approval. The sequence leads to a reduction of a drive—possibly of an acquired nature—for maternal affection.

TABLE 2. Techniques used by parents to help their children with speech.

Technique	*Frequency of Reported Use*
Stimulation	
Show child how to place the articulators for specific sounds	9
Say words for the child to repeat	7
Stimulate with words broken into syllables	5
Emphasize sounds in words, speak distinctly, or similarly call attention to how the parents articulate words	4
Read or sing to the child	3
Repeat words correctly after the child	3
Tell the child how to make the sound or word	3
Imitate the child's speech pattern	1
Give the child experiences by taking him places	1
Provide commercial speech stimulation recordings	1
Talk less to the child	1
Production	
Ask the child to repeat words*	22
Increase the child's incentive to speak (require that he ask for things that he wants)	6
Ask the child to name pictures or toys	6
Ask the child to speak more slowly	5
Ask the child to stop and start over	3
Ask the child to repeat sounds	2
General	
Increase conversational or talking time	2
Demonstrate affection and patience	1
Provide encouragement and praise	1
Nonspecific	
Try to help the child pronounce words plainly	4
Do nothing	3

*No differentiation was made between conducting word drill and asking children to repeat misarticulated and unintelligible words.

Mowrer (*14*) reports that before an infant will produce a word that word must be made to sound good; i.e.,[1] it must be associated with reward. This is accomplished by a stimulus-reward procedure wherein positive emotions are conditioned to stimuli which are produced by a given response.[1] Whether the reward follows the stimulus or the response, reinforcement influences learning positively.

In summary, motivation is seen to be a matter of a drive state which is associated with biological need. Reinforcement, which results from reduction of that drive state, effects learning. Teachers can manipulate reinforcement and thereby influence behavior. Concepts of secondary or acquired drive and secondary reinforcement and the theory of more specific drives will not be considered in this paper; however, it may be mentioned that Allport (*1*, chap. 7) indicates that behavior is functionally autonomous. Once it is

[1]The effectiveness of stimulus-reward association explains the efficacy of adequately conducted sound stimulation in the ear training aspect of articulation correction. The correctionist's provision of speech sound stimulation and reward even though the child is unable to repeat the sound correctly reflects his learning that such stimulation and reinforcement without overt response will probably eventually contribute to elicitation of the desired response.

established by drive reduction, it acquires its own drive. Thus the individual develops a drive for language which, when satisfied, leads to further drive of the same nature.

Whether the teacher is concerned with the vocalization of the infant, meaning of words, elicitation of words from the child, correction of articulation, or establishment of rapport, careful consideration should be given to the reinforcement effect of the teacher's behavior on the client. The teacher must determine what rewards will be effective in influencing the client's behavior. Clinical speech experience indicates that rewards must be utilized in response to cues from the child's behavior. The games approach to speech correction is essentially a means of utilizing reinforcement. It is effective so long as it is goal oriented and varied. Satiation must be avoided.

Parents might well be advised to use varieties of reinforcement in helping their children develop language and speech. The parents of 58 nonrelated preschool children with articulation disorders were asked by the authors to describe the techniques they used to help their children with speech development. Most of these parents, none of whom had had prior speech consultation, described only one procedure (Table 1), and the procedures used most frequently did not involve utilization of reinforcement (Table 2). Parents tend to attempt correction of articulation one word at a time—a potentially interminable task—and to do this by drilling children on word production even though the practice words may be faultily articulated. The speech correctionist who asks parents to conduct supplementary speech work at home should give specific instructions concerning both procedures and reinforcement of procedures. Goda and Smith (*6*) have investigated the speech stimulation practices of a group of parents of preschool children.

Brief attention may also be given to the rewards to which the teacher responds. In addition to salary, commendation, and the well-publicized satisfaction of rendering public service, the teacher's instructional behavior is influenced by the child's responsiveness to his educational methods or techniques. Early exposure of the inexperienced teacher to nonresponsive or negative students may be expected to reduce the teacher's self-confidence and effectiveness unless other kinds of experience are also arranged. Many nonresponsive students may be persons who have been exposed to faulty reinforcement schedules by their teachers or parents.

Intermittent Reinforcement. Animal experimentation (*8*, pp. 90-94) has shown that a response will be made for a greater number of nonreinforced trials if, during the learning period, the correct responses are rewarded intermittently. This principle can be used by the speech correctionist to assure the use of newly learned, correct speech behavior. Like other learning principles, it may also be abused. A teacher or parent who concedes following incessant demands by a child is strongly reinforcing undesirable behavior. Intermittent rewards are especially effective if scheduled in a random order. Use of a regular order of intermittent reinforcement may result in a regular order of intermittent response.

Extinction. In the experimental conditioning situation, cessation of reward

of a learned response results in the gradual suppression of that response. If the speech correctionist can help parents of the child with delayed speech sound and/or language development to cease rewarding gesture, use of gesture will decline, and the child may be more responsive to speech instruction that enables him to satisfy his drives. Following a period of rest, an extinguished conditioned response reappears without additional reinforcement. The spontaneous recovery of previously learned and then extinguished behavior may be reduced by continued nonreinforcement.

Stuttering may be reduced or extinguished by elimination of the various rewards that may be involved. This extinction combined with use of reinforcement to teach more fluent speech patterns is important to several theories of stuttering rehabilitation.

Law of Reinforcement. Writers describing the phenomenological approach to human behavior (*22*, chap 2) agree that behavior is directed to the satisfaction of needs. However, they state that the situation to which a person reacts is not the physical or objective situation but rather a phenomenal situation, i.e., the situation as it appears to the person who is behaving. Regardless of variation in orientation, one of the most apparent facts of learning is that responses are learned as a function of their consequences. McGeoch and Irion (*11*, p. 239) write that in laboratory investigations of human and animal learning the administration of rewards is a widely used technique and that as an empirical fact there is little dispute concerning the importance of reinforcement. The occurrence of learning may be viewed as evidence that reinforcement has taken place.

Contiguity

If the importance of motivation and especially reinforcement to speech and language is recognized, a remaining question is how to time the stimulation and reward of responses. The matter of contiguity or approximation of stimulus and response is of basic concern to students of learning. Bugelski (*3*, p. 280) reports that the principle of contiguity appears to be universally acceptable to all learning psychologists. Contiguity in time—and this generally includes spatial approximation in the environment—is presupposed as a basis for learning.

Disagreement exists concerning precisely what must be close together for learning to occur. Skinner stresses contiguity of response and reinforcer; Guthrie thinks that stimulus and response must be approximated; and Tolman states the important thing is the nearness of two stimuli. If certain of these views were combined, it could be concluded that learning is fostered by contiguity of stimulus and desired response and that this should be followed quickly by reinforcement (*8*, pp. 408-409).

Skinner (*21*) has demonstrated the importance of temporal aspects of reinforcement in operant conditioning. In terms of application, this finding indicates that the teacher must time rewards so that it is the desired behavior which is reinforced. The problem of time lag between response and reward may be overcome by association of an immediate auditory stimulus (acquired reinforcer) with the delayed primary reward. Thus for a time the rat will

work for the sound made by the apparatus that formerly delivered the food pellet, and teachers may intersperse praise with more concrete reward.

If a reward follows a series of acts or complex behavior, the entire sequence may be reinforced. However, that portion of the behavior in closest proximity to the reward will be most strongly reinforced. As Guthrie points out (*8*, pp. 52-54), the thing that one does last in a given situation is the thing that he is most likely to do upon encountering that situation again.

Insight

Learning will be even more effective if the situation is so structured that the learner can achieve an overview of all aspects of the material to be learned. Hilgard (*8*, pp. 234-237) discusses the problems of perceptual organization in terms of the processes inherent in the organism and by structural patterning in the environment. He states that learning is possible only if the learning situation is so arranged that all necessary aspects are open to observation. Currently much interest exists concerning learning machines which provide an incremental learning situation and reinforcement (*5*).

Baldwin (*2*, pp. 115, 587-588) writes that the infant probably learns initially by association of stimulus and response but that later, cognitive learning comes to play a more important role. According to Snygg and Combs (*22*, p. 38), learning and perception may be considered to involve a process of increasing differentiation between figure and ground. They state that in learning and perception the first awareness is of the gross situation; the essential cues and orientation points do not emerge into figure until the learner becomes aware of his need for such details.

Discrimination training in speech correction may be understood in terms of a figure-ground construct or in terms of conditioning. Selective reinforcement may be used to teach a subject to discriminate between two similar stimuli or to generalize from one stimulus to another one like it (*8*, pp. 51-52).

Repetition

Even though one trial learning has been demonstrated, repetition seems essential to remedial speech and language instruction. The clinician must decide whether to give a client one long session each week or to distribute the same total amount of time over several sessions each week. Admittedly this problem is sometimes resolved by the exigencies of scheduling and transportation. Nevertheless, from a long series of experiments (*11*, chap. 5) the conclusion may be reached that in general and under a wide range of conditions distribution of practice is more effective than the massing of practice. This consistent finding is explained by the concept of inhibition. Since study involves work or effort, it results in inhibition as well as in learning. As practice time is increased, more interference is developed and therefore learning during the session increases at a decreasing rate. In preparing a lesson schedule, the speech clinician must consider such factors as the age, intellectual level and personality of the client, stage of instruction, kinds of remedial procedures being used, and the principle of distributed practice. A comparatively longer lesson period may

give the clinician more opportunity to establish and maintain rapport with the client and to counsel parents. Futhermore, the individual session may be broken up into periods of concentrated work and more leisurely moments. Some clinicians have found it effective to do the more concentrated part of their work during the early part and near the end of the session.

Imitation

Mussen and Conger (*16*, p. 131) state that by imitation the growing child adopts responses to reduce both primary and learned drives. The statement is often made that speech and language are learned by a process of imitation. McCarthy (*10*, pp. 517-520) observes that because the normal child learns the language of his environment whereas the congenitally deaf child does not learn to speak without special help, one may assume that imitation through listening is important to the language learning process. However, the invention of language by environmentally deprived pairs of children suggests that there is more to language development than imitation. Teachers of the deaf teach children to imitate as a step in learning to communicate. This is usually done first by teaching the child to associate the teacher's speech movements with actions, pictures, printed words, etc., in a meaningful situation and then by stimulating the child repeatedly with these speech movements and associations. The instruction is done in a pleasant atmosphere, and satisfactory responses are rewarded by praise or other means. Deaf children have also been taught to imitate speech sounds as preparation for speech and and language learning. However, required imitation of isolated speech sounds without understanding the purpose of such imitation seems to neglect the principle of insight. Thus imitation may be used effectively if the material being taught is suitably organized and presented.

Although imitation may be a factor in language development, it is not a useful explanatory concept at the present time. Most of the statements about the role of imitation in language acquisition have been made by persons who were observing and describing the behavior of children. Learning psychologists have had much less to say about the topic. Bugelski (*3*, p. 468) wrote that while imitation is a universally recognized phenomenon in learning, few systematic studies of the process have been performed. The most frequently referred to experimental work on imitation was done by Miller and Dollard (*12*, chap. 7), who found that one rat could be trained to imitate another. They concluded that imitation is a learned process.

The relationship of imitation to various principles of learning apparently has not been determined, nor have the circumstances been determined under which imitation occurs. Before language acquistion is attributed primarily to imitation, the subject should receive intense investigation. Until this has been done the process whereby speech and language are best taught should be explained in terms of better understood concepts. Mowrer (*14*, *15*, chap. 3) points out that the problem of understanding language learning is also the problem of understanding imitation and that to explain one with the other is circular and tautological.

Conclusions

Certain basic principles of learning have been explained in terms of their application in the teaching of speech and language. This information is viewed as complementary to the ideas of other writers (*9, 18*). It is concluded that speech clinicians and teachers of the deaf are either using or abusing these principles of learning. The principles discussed are of a general nature. They are not to be followed blindly but rather should be modified to suit each client. No mention has been made of certain interesting topics within the field of human learning, for example, transfer of training, recency and vividness of learning experiences, scheduling of learning periods during the day, and over-learning.

While behavior research in the learning area has great significance for clinical speech work, it should be noted that speech acquisition can be used in the laboratory as a means of furthering investigation of human learning. Winitz and his colleagues (*4, 25*) are investigating problems and structuring research in this area.

Summary

Motivation for speech and language development is seen as a function of drive. Learning of speech and language is enhanced by careful reinforcement of response, contiguity of stimulus, response and reward, and by structuring the learning situation so that insight is fostered. These factors are probably involved in the techniques that have evolved in clinical speech and language instruction.

Imitation is often mentioned as the means whereby the child develops language, but little is known about the nature of imitation.

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Organismic Development of Oral Language

• *Edward D. Mysak*

A portion of a recent article (*9*) suggested that therapists often adopt atomistic approaches when dealing with the problems of cerebral palsied children. As a brief example, the speech clinician, when planning to excite prelingual echolalia, may only consider the child's age and disregard other very important developmental considerations. In contrast, the holistically oriented clinician realizes that this type of vocalization is normally reached when general and oral reflexive maturations are characterized, at least, by standing, biting, and chewing activities and plans accordingly. This type of organismic-developmental philosophy adds greatly to habilitation programs for these children. The application of this kind of thinking when dealing with specific language retardation or dysfunctioning should also be generally appreciated.

When reviewing developmental sequences in the available speech literature, however, e. g., *1*, chap. 3, *4*, *13*, chap. 5, it may be found that: (a) important associated developmental sequences are not systematically considered, (b) the emphasis is placed on the expressive aspect, and (c) the description does not extend far enough, or until the process resembles what may be called adult symbolic intercommunication. The specific purpose of this paper is to describe the organismic development of oral language up to about the eighth year and to outline general principles in therapy based on this maturation.

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Introduction

Oral language development is the result of the simultaneous maturation of the perceptorium, the vocalization mechanism, and the general motorium. The latter maturation makes it possible for the individual to experience the necessary stimulation from the environment. These three systems, acting as a whole, are responsible for the development of oral language.

The perceptorium important for oral expression may be thought of as basically representing an eye-ear-hand unit, that is, a visual-auditory-tactual receiver, or environmental explorer (olfaction and gustation are also important). This sensory unit develops the capacity to integrate, simultaneously, various types of energy into a new total sensory configuration which represents the particular part of the environment being experienced. For example, if the perceptorium is exposed to an apple it may receive and integrate visual, auditory, tactual, olfactory, and gustatory afferential inflows into a sensory configuration that stands for 'appleness.' Primitive interoceptive sensory patterns are also experienced with reference to

pain, hunger, etc. It is only when the system can develop such excitations that some type of linguistic code becomes useful, in terms of naming, categorizing, or expressing them.

The vocalization mechanism comprising the respiratory-phonatory-articulatory complex and the general motorium develop concurrently with the perceptorium. Up to the time of the first propositional words, these developments emerge as a function of the neuromuscular evolution that carries the child from the apedal to the quadripedal and finally to the human bipedal stage of organismic activity (*9*).

It is believed that this type of holistic view will contribute to a better understanding of oral language theory, and hence to principles of oral language habilitation. From a personal standpoint, the orientation has been found to have substantial clinical value in diagnosing and planning therapy for oral language problems in children.

Accordingly, the section on sequential development has been organized in a manner which indicates the concomitant eye-ear-hand and general motorium maturation at each of the successive stages of oral language development. It will also be seen that these stages have been further organized to consider this total maturation in terms of feedback theory. The significance of the latter organizational consideration has been discussed in previous articles (*7, 8,*) as well as in a recent and most interesting book by Van Riper and Irwin (*14*). The articulation and voice therapy sections in this book are outlined in terms of this philosophy.

Developmental Sequence

In the ensuing outline an attempt will be made to present enough information (a) to convey the desired concepts relative to oral language growth and (b) to provoke ideas that will have practical value in language habilitation. References used, with respect to various developmental progressions cited, include Gesell and Amatruda (*2*) for general maturation, Berry and Eisenson (*1*, chap. 3, p. 493) for early vocalization and prelinguistic sounds, and Myklebust (*6*) and Strauss and Kephart (*12*, chap. 4) for ideas on language and perception.

System Disequilibrium. Up to about the sixth or seventh week the perceptorium may be considered as *closed cycle*, that is, the child responds basically to interoceptive sensations related to hunger, thirst, etc. However, visually the child will follow an object to the midline with combined eye and head movement through an arc of 90 degrees. As for hand and tactile appreciation, the grasp reflex is present and the hand can be brought to the mouth. Auditory responses are limited to startle activity in response to unexpected loud sounds and immobilization to the ringing of a bell. In terms of general motor development, the child can usually hold the head erect in the prone-lying position. Vocalization heard at this time is usually in response to the interoceptive sensations mentioned and consists mainly of crying and screaming, or reflexive vocalization. Sounds heard may include: [i], [ɪ], [ɛ], [u], [ʊ], [h], [k], [ʔ]. Observation reveals no *closed cycle* auditory appreciation of this vocalization. There is a type of primitive *open cycle* value inasmuch as another individual reacts to this vocalization and communicates meaningfully by appro-

priate feeding, changing, etc., behavior.

System Equilibrium. At about six or seven weeks to six months the perceptorium reveals the following progress: (a) Visually, after a particular sequence, the eyes at about six months can regard an object in the midline and follow it through 180 degrees, and very importantly come into joint action with the hands. (b) Tactually, the hands have accomplished grasping, pulling, clutching, shaking, scratching, and raking movements. (c) Auditorially, a level of sound discrimination is reflected by localizing behavior. General motor development includes the capacity to hold the head erect in the supine-lying position as well as reaching ability (initiation of perceptual field expansion). Vocalization is characterized by coos, gurgles, snorts, and grunts in reaction to pleasant internal or external experiences, or primitive perceptions, and has been called babbling. Sounds heard may include: [e], [æ], [ou], [g], [ɑ], [ɔ], [ʌ], [ə], [j], [m], [p], [b], [w]. The inception of a *closed cycle* auditory feedback is now noted because the organism reveals awareness of its sound production by its facial expressions, by making sounds during pleasant moments, or by making sounds to elicit parental reactions. This stage also has a type of *open cycle* value since it informs adults of organismic homeostasis.

Primary[1] *Closed Cycle Vocalization.* From approximately six to nine months further visual maturation is observed and the child reveals an ability to discriminate among different individuals. As for tactual experience, the child can now slap and use a scissor grasp. Auditorially, sound discrimination reaches the level where at approximately nine months the child may begin to manifest meaningful motor behavior in response to his name. General motor development reflects crawling and sitting capacity which means the system is now able to convey its perceptorium through space. This is significant for future perceptual-speech development. Vocalization has reached the lalling stage and the child is now observed to repeat self-produced sounds or sound combinations. Sounds heard during this phase may include: [t], [d], [n], [l]. Pleasant sensations are again primarily responsible for the vocalization. This period represents the development of a *closed cycle* auditory feedback mechanism. The child may also be noticed to use sound for the specific purpose of attracting attention, which indicates the initiation of *open cycle* vocal activity.

Primary Closed and Open Cycle Vocalization. From about nine to 12 months the perceptorium has advanced to the place where eye-hand activities include cooperating in dressing, giving toys, and finger feeding. The hand is now capable of hitting, pushing, waving, and effecting a neat pincer grasp. Auditorially, the child's sound discrimination reaches the level where he may make appropriate responses to his name, 'no,' and simple 'give me' requests. General motor development is characterized by standing ability. Vocalization has developed to the echolalic stage and the child may be observed to imitate sounds made by others. Sounds heard may include [ʃ], [s], [z], [tʃ]. Again, echolalic activity is usually in response to pleasant experiences and represents the addition of *primary open cycle* vocalization.

[1]Feedback of nonpropositional sounds.

Closed and Open Cycle Propositional Vocalization. At 12 to 18 months the perceptorium has evolved to the level where the child can recognize pictures, scribble, and feed himself. Sound discrimination reflects the ability to follow simple requests and directions. General motor development has reached the walking stage. As for speech, the child may use a few single words meaningfully, indicating the acquisition of *closed* and *open cycle* propositional vocalization.

On the basis of the discussion of oral language development to this point, it appears that the most interesting way to explain this development is by Mowrer's Autism Theory (*5*). In essence, the theory indicates that certain sounds or word-noises may be elicited from a child by the following sequence of events: (a) A speaker comes to represent positive emotional connotations for the child by engaging in such pleasure-producing actions as feeding and playing. (b) A speaker produces a specific word-noise just before and as he confronts the child. (c) A speaker eventually evokes positive emotional feelings within the child by his word-noise alone. (d) The child experiences a concomitant positive emotional feedback when he approximates the speaker's word-noise during random vocalization. (e) The child repeats the approximation and strives to perfect it because he feels greater degrees of satisfaction from the feedback when he produces the word-noise more accurately. (f) The child retains the learned word-noise because of the influence of social approval.

Closed Cycle Verbalizing. During the period from the first propositional utterances to about the third year there is a rapid increase in percept formation as well as in the development of word-noises with which to label these percepts. Subsequently, as the child develops the capacity to use short combinations of word-sounds, he may be observed to accompany his activities with these words, that is, he engages in what Piaget (*11*, p. 9) called egocentric language. Piaget (*11*, p. 40) also indicates that gestures, mimicry, and expressions are used as much as words at this time. Aside from expressing wants and needs (inception of *initial open cycle* verbalizing), this period is fundamentally a time when the child undergoes *closed cycle* perceptual-linguistic development. In other words, the child may be said to be vocalizing his perceptual processes (*12*, p. 94). In order, this is a phase during which the child, with the aid of speech, stabilizes, expands, and maintains an organized sequence to his perceptualization. The word-noise at this time actually represents the object and seems only to act as a substitute for it.

Closed and Initial Open Cycle Verbalizing. At about three to five years, the process of mature intercommunication is emerging and the child may be seen to share his percepts, as well as to elaborate his own by listening to the experiences of others. The child's communication is characterized by criticism, commands, requests, threats, and by questions and answers.

Closed and Open Cycle Verbalizing. From the last period to about seven or eight years perceptualization development continues to the place where the percept is no longer limited to a representation of the object experienced. Strauss and Kephart (*12*, p. 103) indicate that by virtue of perceptual

selectivity '. . . the perceptual image will become schematized and will lead to a general perceptual schema. Language at this point will become symbolic and, in interaction with the perceptual schema, will lead to thinking and reasoning as we know them in the adult.' At this time the word no longer merely represents the object but is a symbol for a differentiated perception. As symbolization develops, the child reflects the ability to analyze and synthesize elements from a number of perceptions into new wholes or conceptual units. Conceptualization begins at about seven or eight and it is then that the child's language resembles adult symbolic intercommunication.

Before describing some proposed servotherapy principles, it would be advantageous to review Penfield's (*10*, pp. 245-246) neurophysiological explanation of oral language development. He describes the formation in the CNS of three types of neuronal patterns which represent what he calls the conceptual, sound, and verbal units. For example, the word 'milk' is acquired by the child in the following manner: (a) By experiencing milk many times and in many ways, he eventually establishes a neuronal pattern, or conceptual unit in the concept mechanism (both hemispheres involved) which represents the idea of milk. (b) By consistently hearing the word-noise 'milk' in association with the experience, he eventually establishes a neuronal pattern, or sound unit, in the cortico-thalamic speech areas in the left hemisphere which represents the heard word-noise 'milk.' (c) By the frequent association of conceptual and sound units an automatic and reciprocal reflex connection between the two units is developed. (d) By virtue of forming conceptual and sound units and the reflexive connection between the two, he eventually establishes a neuronal pattern, or verbal unit, in the cortico-thalamic speech areas in the left hemisphere which represents the spoken word-noise 'milk.' In addition, Penfield states that particular gestures used by individuals to convey meaning while speaking, or instead of speaking also have neuronal units in the speech mechanism.

Penfield's description again accentuates the importance of a holistic view of oral language development when planning therapy for the language-involved child. Frequently, clinicians concentrate on attempting to evoke the last aspect of the process, or verbal units, with the excitation of conceptual and sound units often being only incidental to this goal. Whereas it would appear that if a conscious emphasis were placed on stimulating and enhancing conceptual and sound units, the verbal units might not need as much specific attention.

Oral Language Excitation

Attention to the foregoing description of oral language development might motivate clinicians to consider routinely the following four general procedures when preparing to work with linguistically involved children: (a) Analyze for level of vocalizing-verbalizing development. (b) Stimulate appropriate fundamental eye-ear-hand activity. (c) Expose the child's perceptorium to a clinical environment which is larger than the usual therapy room. (d) Follow the proposed normal sequential development of vocal expression.

The succeeding discussion will serve

to elaborate on a few of these ideas. Specific activities under each of the general headings should be developed by clinicians to suit their particular cases.

Spontaneous Sound. As revealed in the section on development, *system equi-* or *disequilibrium* usually results in some form of vocalization. That is, positive or negative experiences such as hunger, pain, fear, happiness, or pleasant movements often result in concomitant sound production. (It is also often heard that during certain negative or positive emotional states individuals report enhanced capacities to remember or learn. The mechanism operating here might be related to a centrencephalic-autonomic-glandular system interaction resulting in certain circulatory and hormonal activity which, in turn, results in positive CNS conditioning.) The clinician, therefore, should develop the capacity to excite appropriate emotional states which might facilitate perceptual-vocal activity, for example, planning well-controlled excitation of needs, wants, and desires which the cliniciate could resolve by suitable vocalization. The principle under consideration involves the activation of spontaneous sound as opposed to the direct teaching of vocalization. Relative to *system equilibrium,* Mowrer's Autism Theory of speech development, or the idea that, 'if positive emotional connotations can be given to certain sounds, as produced by others, the subject will, himself, have a strong disposition to make the responses which produce these sounds' (*5*) should also be exploited.

Perceptual Amplification. According to Penfield's discussion, without the growth of neuronal patterns representing perceptual experiences, the acquisition of meaningful sound or verbal units is impossible. Hence, the language clinician should place a great deal of emphasis in his therapy planning for heightened perceptual excitation. Perceptual amplification techniques might involve the following: (a) Clinicians should capitalize on the strong interests of the cliniciate. (b) The stimuli used should be presented in related groups of appropriate size and complexity. The recommended sequence is to begin from the point of reference, or self concept (body parts), and extend outward to family members, food, clothing, home, and, subsequently, out into the surrounding environment. (c) Whenever possible synesthetic experiences should be planned by using materials that would excite visual, auditory, tactual, kinesthetic, gustatory, and olfactory sensations. (d) *Closed cycle* imagery excitation, or association area activation, should be encouraged. That is, if possible, and where suitable, the clinician should have the child think or imagine an object's color, texture, taste, and smell. (e) Stimulus intensification techniques should also be considered. Manipulating size, form, color, distance, and directional aspects for visual experiences, loudness, pitch, quality, and time factors for auditory experiences, and textural characteristics for tactual experiences are ways in which this can be accomplished.

Receptive Primacy. On the basis of previous statements, it would appear advantageous for clinicians working with children lacking verbal units to plan on initially developing or elaborating comprehension of pantomimic-gestural and sound units. A recommended procedure would include receptive saturation exercises such as,

'give me,' 'put the,' 'bring me,' 'show me,' 'where is?' activities. The emphasis is not on verbal unit but on suitable whole-body responses. Furthermore, since it has been reported that understanding of gestures (*3*) precedes understanding of word-noises, the clinician, where appropriate, should plan his stimulation periods accordingly.

Closed Cycle Primacy. It has been shown that *closed cycle* activity, or intracommunication processes, develops first. The clinician, then, instead of attempting to excite either *open cycle* vocalizing or *open cycle* verbalizing (traditional orientation), should attempt to activate, where appropriate, the respective *closed cycle* activity. As for promoting intraverbalizing, clinicians might indulge in parallel talking or self-reporting while engaged in some meaningful activity and hope to stimulate similar behavior in the observing cliniciate.

Expressive Levels. Three levels of linguistic expression may be recognized and should be considered when specifically attempting to elicit some form of expression: (a) gestural-pantomimic (includes hand and limb movements, body posture, and facial expressions) in association with random vocalization, (b) gestural-pantomimic in association with onomatopoesis (lower order such as gr-r-r-r or z-z-z-z for animal sounds, or higher order such as bow-wow, bang, boom, splash, etc.), and finally (c) gestural-pantomimic in association with propositional vocalization (mature intercommunication). In addition, consideration of reverse feedback principles might also prove beneficial when attempting to elicit initial vocalization. It may be seen when smile or happy expression postures are assumed, especially by children, that the associated proprioceptive feedback may subsequently produce the related emotional state. Similarly, if the clinician can excite random articulatory movements or 'mouthings' in the cliniciate, spontaneous vocalization may also be observed to occur eventually.

In conclusion, as with the previously presented concepts (*7*, *8*), further development and substantiation of some of the described hypotheses on oral language maturation and stimulation will depend on the outcome of further clinical application and research.

Summary

Oral language maturation is discussed from an organismic-developmental point of view. The possible importance of this orientation with regard to planning procedures for linguistically involved children is implied. An outline of general ideas for oral language activation is also presented.

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Effect of Word Cue Removal on Adaptation and Adjacency: A Clinical Paradigm

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- *Burl B. Gray*

The adaptation effect refers to the behavioral finding that, all things being equal, stuttering responses decrease as a negatively accelerating function of massed readings. The experimentally corroborated stability of this response class and the lawfulness of the behavioral decrement has led to the consideration of adaptation as a 'laboratory model of the improvement process' (*1*, p. 257). It followed, from this frame of reference, that clinical significance was attributed to the specified experimental conditions which resulted in the modification of the course of adaptation. Thus, an increment in response frequency suggested therapeutic regression, and a comparatively greater decrement in the course of adaptation indicated improvement.

Adaptational investigations (*2*, *3*, *5*, *6*, chap. 8) involving the manipulation of independent variables and the observation of consequent dependent changes pointed up the role of (a) specific words, indicative of previous stuttering experience, as precipitating cues to moments of stuttering and (b) generalization in the spread of noxious effect from specific words indicative of past fluency failure to adjacent words which were originally below threshold in cue value precipitous of stuttering behavior. These data were the basis, partly, for an investigation by Johnson and Millsapps (*4*) instituted to determine whether the removal of previously stuttered words from an oral reading passage would heighten the decremental course of adaptation. Though the blackout removal of words previously stuttered resulted in a significantly greater frequency reduction than in the nonremoval condition, it became apparent that the blackouts, too, were cues which signified previous failure. Despite the fact that the blackout cues were less specific and lower in excitatory potential than word cues, some adjacent stuttering occurred and the decremental slope of adaptation was purportedly inhibited.

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Purpose

It may be apparent that a method of word removal which attenuates cues indicative of past fluency failure might permit a more effective evaluation of the extent to which such cues precipitate stuttering behavior and retard

the adaptation effect. In terms of a clinicial paradigm, implications which accrued from such data might permit the ascertainment of techniques resulting in reduced adjacency and facilitated adaptation. Thus, the purpose of this investigation was to determine the extent to which cue-attenuated removal of previously stuttered words affected adaptation and adjacency responses by comparison with an analogue of the partially successful blackout procedure. More specifically, this research was concerned with (a) the degree of within and between condition adaptation under two disparate techniques for the removal of word cues signifying past stuttering and (b) the extent to which the two removal conditions are followed on a succeeding trial by stutterings attributed to adjacency.

Procedure

The subjects of this experiment were 20 individuals who had been classified as stutterers independent of the experimenters and prior to the onset of this investigation. The material to be read orally during the adaptation trials consisted of 149 nouns chosen, by procedures designed to achieve randomness, from Thorndike's list of the first 3000 most frequently used English words. These nouns were embossed on individual 4″ x 6″ cards which were white on the word bearing side and yellow on the reverse side. Eighty-four of the word cards were randomly assigned to the control condition, and 65 of the word cards were assigned to the experimental condition. In both conditions, the word cards were placed on a display board, filling it completely. The display board, which was lined with black material, had wooden runners to give horizontal support to the word cards. Between-condition differences existed, however, in both the manner of word presentation and in the method of word removal. In the control condition, the display board was filled by placing the words so that each card approximated the adjacent cards. Following the completion of each oral reading trial, all word cards on which stuttering had occurred were reversed to the blank yellow side. In the experimental condition, the words were placed in an unstructured pattern of cards and background spaces designed to minimize awareness of the removal of cards previously present. The Trial 1 arrangement of word cards was known and held constant for all subjects. Following the first reading, all word cards on which stuttering had occurred were completely removed, and the remaining words were spatially rearranged. This modified arrangement of word cards and background spaces occasionally necessitated a change in line position of the remaining words, but the order of the nonstuttered words was never scrambled.

In both the experimental and control conditions of word removal, the completion of an oral reading trial was followed by the subject's swiveling his chair so that his back faced the display board. During the succeeding two-minute interval, the experimental or control modifications were made, and display board activity was maintained to fill both the timed interval and to mask the specific purpose of this activity. On the signal, 'Begin oral reading,' the subject turned in his swivel chair, faced the display board, and read the sentence-ordered list of nouns in his normal conversational manner.

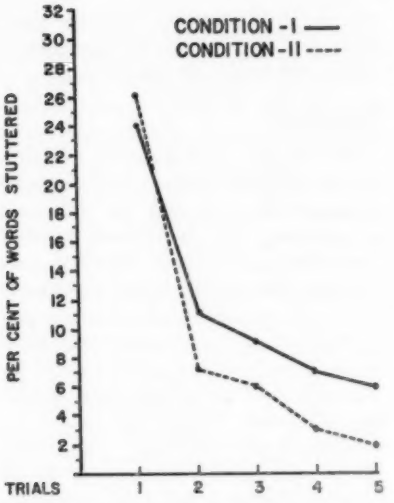

FIGURE 1. Percentage of words stuttered during adaptation trials in control Condition I (stuttered words removed by reversal of word cards to blank yellow side) and in experimental Condition II (complete removal of word cards on which stuttering occurred).

The subjects of this experiment participated in both the experimental and the control conditions. The order effect was minimized by counterbalancing the presentation of removal procedures.

RESULTS

Figure 1 is a graphic presentation of the percentage of words stuttered under the two conditions of the present investigation. Both the control condition, involving an analogue of blackout removal, and the experimental condition, involving complete word card removal, showed an adaptation between the first and last trials which was significant beyond the one per cent level of confidence. Indeed, all within group comparisons between Trial 1 and the succeeding trials were similarly significant. Despite the fact that both conditions adapted significantly, observation of the data indicated possible differences in the degree of reduction because of the larger critical ratios which were obtained in the experimental condition. This finding pointed to a between group trial by trial analysis of the decremental slope.

The percentage of stuttering in the experimental condition during Trial 1 was 25.0, while in the control condition it was 22.8 per cent. This difference was not significant at the five per cent level of confidence and thus adds support to the manner by which the experimental words were selected and distributed. The direction of this difference should be noted, however, because of the descriptively meaningful reversal which occurs on the next trial. A between-condition comparison on the second trial indicates the presence of heightened adaptation in the experimental condition which was significant beyond the five per cent level of confidence (t of 2.23). This difference in the depth of adaptation between the experimental and the control conditions was increased on the remaining three trials, all of which showed critical ratios that were significant beyond the one per cent level of confidence. These data indicate that cue-attenuated removal of noxious cues results in a greater decrement than that achieved under a procedure which removes the specific word cues and supplants it with general signs of fluency disruption. The fact that the original blackout procedure resulted in a greater decrement than that found in the standard adaptation procedure may indicate that the degree of adaptation is a function of the strength and verbal specificity of the noxious cues. If this

assumed functional relationship has any validity, it should be appropriate to assume also that the adjacency effect would increase the more nearly the remaining stimuli approximate the initial noxious cues. Thus, one might expect greater adjacency to result in the control condition than in the experimental condition of word removal.

A between-condition analysis of adjacency was made by determining the number of words stuttered during Trial 2 which were adjacent to the removed stuttered words in Trial 1. This numerator was divided by the number of opportunities for adjacency in the second trial. The critical ratio for the difference in adjacency between the experimental and control removal conditions approached significance at the five per cent level of confidence (t of 1.48). This degree of significance was congruent with the degree of adaptational difference between the two conditions on the second trial and accrued despite the fact that both conditions had affected the removal of previously stuttered words. The data appear to indicate that (a) the blackout procedure used herein has greater net excitatory cue potential than cue-attenuated removal and (b) stronger and more specific noxious cues result in greater adjacency.

The difference limen in cue awareness, investigated following the completion of the experiment, was attested to by the reports of the individual subjects. In the control condition, the subjects reported often a conscious awareness that the yellow cards signified points of previous fluency failure; whereas in the experimental condition, the subjects professed no knowledge of the manipulations which had obtained or indicated incorrectly that the word cards had been positionally reordered during the course of the readings.

Discussion

Historically, experimentation has revealed that general and specific cues of fluency failure produce an increment in stuttering over a previous level of such disfluent behavior. The data indicate also that general speech associated cues and specific word cues of past disfluency may elicit adjacent stutterings where it had not previously existed. The results of the present investigation indicate that adaptation may be heightened and adjacency reduced by the cue-attenuated removal of words indicative of past stuttering. This removal has the function not only of reducing noxious cues but also results in an increment in the ratio of cues indicative of past verbal success. Since spread of effect is not restricted to noxious cues, modification resulting in an increase in cues indicative of speech associated reward is consonant with therapeutic procedures. This experimentally supported theoretical position is the basis for the proposed clinical paradigm in which cues indicative of past success would be placed so as to capsulate previously stuttered words. It is assumed that a positive adjacency effect will accrue through generalization and that the ensuing speech behavior will result in integrative reinforcement. Here, then, is a procedure designed to cancel maladaptive speech behavior through reinforcement which is redirected toward the acquisition of positive expectancy and an expanding vocabulary containing cues of fluency. The exploration of this procedure leads to the tentative suggestion that the

order of the words returned to the reading passage should be an inverse function of response latency. Thus, the words stuttered during the trial previous to the fluent session should be re-entered before those words which were stuttered on the earlier trials. As the hierarchy of responses is modified, through the desensitization of noxious cues and the reinforcement of fluent behavior, a positive expectancy appears to habituate and additional words may be replaced.

Summary and Conclusions

The adaptation effect has been considered a laboratory model of the improvement process, and clinical significance has been attributed to its increment and decrement under specified experimental conditions. Further research with adaptation pointed up the role of specific words as noxious cues of past failure and indicated that the spread of effect resulted in adjacent stuttering behavior. These findings led to an investigation instituted partly to determine if the blackout removal of previously stuttered words would heighten the decremental course of adaptation. The removal of cues of past failure resulted in significantly more adaptation than under the standard adaptational procedure, but the blackouts acted as noxious stimuli which precipitated adjacencies and inhibited the response decline.

The present study was designed to determine the extent to which cue-attenuated removal of previously stuttered words affected adaptation and adjacency by comparison with an analogue of the blackout procedure. Though both removal conditions resulted in a significant adaptation, a between-condition analysis indicated significantly more trial by trial adaptation in the experimental condition. In addition, cue-attenuated removal elicited less adjacency to an extent which approached significance.

In light of the fact that (a) cue attenuated removal results in an increment in the ratio of cues indicative of past verbal success and (b) spread of effect is not restricted to noxious cues but may occur in association with cues of reinforcement, the results of this study are consonant with therapeutic procedures. Specifically, a clinical paradigm is proposed in which word cues indicative of past success would be placed so as to capsulate previously stuttered words. It is assumed that a positive adjacency effect will accrue through generalization, and that the ensuing speech behavior will result in integrative reinforcement.

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CLINICAL FORUM

• Unexpected Dividend in Békésy Audiometry

In a paper recently published in the *Journal of Speech and Hearing Research* (3, 1960, 275-287), Jerger detailed a method for the analysis of Békésy-type audiograms based on the relationship between threshold tracings for continuous and periodically interrupted tonal stimuli. Four basic types of interrelation were described, corresponding to lesions of the middle ear, the cochlea, and the VIIIth nerve. In all four types interpretation was based on the manner and extent to which the threshold sound pressure level for a continuous tone was either equal to or greater than the threshold sound pressure level for a periodically interrupted tone. In none of the clinical records on which this analysis was based was the converse observed, i.e., a greater threshold sound pressure level for the periodically interrupted than for the continuous tone.

In actual fact, however, we have, in the past three years, observed this converse relation in exactly three of the more than 600 Békésy audiograms gathered during that period. We think it is worthy of more than passing note that in each of these three cases all of the available evidence strongly suggested either malingering or psychogenesis as the primary problem. Each of these three patients ultimately demonstrated normal acuity on the ear in question either for pure tones or speech.

Figure 1 summarizes pertinent data obtained on one such patient, a 39-year-old male construction worker who was hit on the back of the head by a supply elevator causing him to fall forward onto a pipe. The accident resulted in a broken nose and jaw and left him dazed for a considerable period. The patient was hospitalized for his injuries from November 1960 until March 1961. Since the accident he has reported tinnitus, pain, and hearing loss in the right ear only.

Three conventional air-conduction audiograms for the right ear are shown. Audiogram A was made on March 30, 1961. Audiogram B was made on April 28, 1961, at the beginning of the test period, and audiogram C was made on the same day, but at the end of the test session. All of these audiograms represent voluntary responses.

The Békésy audiogram shows that, in the range from 250 to 2000 cps the threshold sound pressure level for the continuous tone is as much as 20 db less than the corresponding threshold sound pressure level for the periodically interrupted tone. Such a discrepancy in levels is not extraordinary if one considers the difficulty such a patient must face in equating the loudness of a continuous tone with that of a relatively rapidly interrupted tone. In any event the unique Békésy tracings displayed by three patients suggest an additional tool for the study of non-

Clinical Forum contributors are invited to send manuscripts to the Editor, *Journal of Speech and Hearing Disorders*, Los Angeles State College, Los Angeles 32, California.

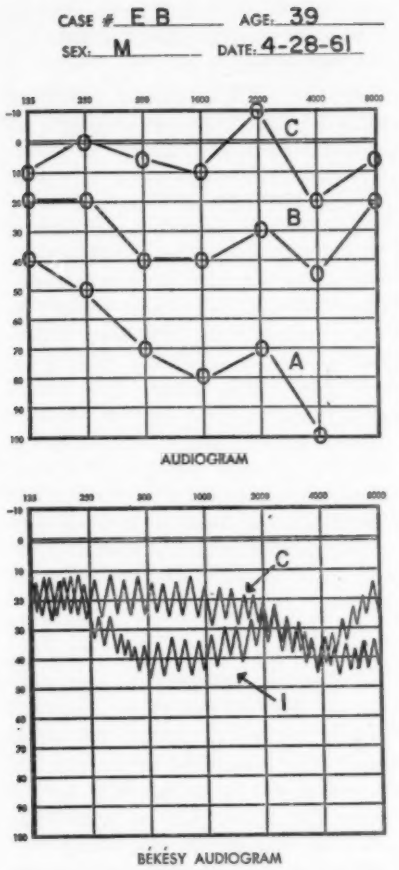

FIGURE 1. Audiometric data for the right ear of a 39-year-old male construction worker who complained of tinnitus, pain, and hearing loss in the right ear subsequent to a severe blow on the head: A, B, and C, successive voluntary audiograms; Békésy audiogram I, for periodically interrupted tone; Békésy audiogram C, for continuous tone.

organic hearing loss, and we offer our observations in that spirit.

Veterans Administration JAMES JERGER

Michael Reese Hospital GILBERT HERER

• Concepts of Speech Development

The prevailing concept of speech development in children can be likened to a sculptor working in the medium of clay, building up from a daub or substance and adding what is needed to complete the finished *object d'art*. Many of our resources, texts, and research reports seem to be oriented in this direction, discussing the order of the acquisition of speech sounds, stressing a building-up of a speech sound repertoire.

Simon takes issue with such work because, as he puts it,

> There is no way of knowing when a sound or series of sounds 'begins.' Careful testing will reveal that a certain phonetic element does or does not appear today. If it does, there is little guarantee that it will occur again in the immediate future; if it does not, the observer is left with the open question whether it was used yesterday or will be tomorrow. (The development of speech. In L. E. Travis (Ed.), *Handbook of Speech Pathology*. New York: Appleton-Century-Crofts, 1957, p. 34.)

C. K. Thomas (in personal correspondence) questions the approach typified by studies based on the order of the acquisition of speech sounds not on the grounds of the reliability of the research, but rather the reliability of the underlying theory. Should our consideration of speech development be oriented to the acquisition of speech sounds during the early months of life?

The alternative approach can be likened to a sculptor beginning with a block of marble, chiseling away what is unnecessary until he is left with the finished *object d'art*, then polishing and refining the finished product. Analogous to this is the concept of the

child beginning with a large repertoire of speech sounds (many not included in his native language). Through processes of conditioning the repertoire is chiseled to contain the sounds necessary in his language–sounds which are not reinforced by the speech of his verbal environment are eliminated and the child is left with an *object d'art*, a repertoire which contains his approximations of the sounds he hears. As the neuromusculature and sound discrimination processes mature, the child refines and polishes this repertoire into the sounds of his native tongue, gaining voluntary control over their production.

Accordingly, studies of sound acquisition might well be based on the concept of the acquisition of voluntary production and refinement rather than the 'happenstance' production of sounds in the early months of life.

SUZANNE SMITH OSBORN

University of Florida

- **Stuttering Manifestations Following Spinal Meningitis**

T.G. was a physically normal child with adequate speech until an attack of spinal meningitis at the age of seven years, six months. Right hemiplegia resulting from this disease restricted the child quite severely so that he was not able to accomplish many physical activities which he enjoyed prior to the onset of meningitis. Further, he was forced to remain an additional year in the second grade because the illness caused him to miss two months of school. T.G. apparently spoke without difficulty on his return to school. However, in the second month he began stuttering with increasing severity. The child was brought for speech rehabilitation 18 months after his recovery from meningitis.

Problem. T.G.'s speech repetitions were extremely variable, ranging from minimal repetitions during an hour's free conversation to one in every four words. The variability seemed to be related to the nature of the material he was discussing. The repetitions were without tension or secondary symptoms and consisted almost entirely of whole words with occasional repetition of the initial element of a word. Although T.G. knew that people thought he stuttered, he stated that he had no concern about his speech. His mother, however, was quite concerned about it and stated that his teachers were, also. The child was very insecure, showing extreme anxiety when competing with his three brothers and classmates.

Therapy. Initial therapy was quite permissive with the child choosing the activities which included racing games and the throwing of cards. T.G. had to win any games played. He would show how rapidly he could run and how quickly he could pick up the cards. He would flex his muscles to show his strength. In play acting with rubber animals and people, the largest animals, the horse and cow, would always kill everyone except the two smallest animals, the rabbit and chicken. Then T.G. became the 'murderer.' He would kick and step on the animals, periodically talking about the children in his room who were always beating and stepping on him. He became the 'murderer' in acting out many murder mysteries which he saw on television. Two children, a boy and girl would run away and hide for several days.

Then the two children returned to beat their parents. The children began riding horses, and the girl fell, breaking her arm. T.G. quickly took the girl to a doctor where the arm was mended.

T. G. drew pictures of a boy, his house, and a girl. The drawings of the boy always showed one arm and leg shorter and thinner than the other arm and leg. He stated that his house 'won't hold together.' He made four attempts to draw a girl but never succeeded in finishing a drawing.

He began to talk about words which he was afraid to say. The word fears were all nouns: mother, father, the names of his brothers, the names of several members of his class, and the name of his teacher. He wished he were a clock so that he could remain on a wall where he could see everything and not have to do anything. He would be left alone except for brief moments of winding.

Throughout this indoor activity there was little change noted in his stuttering. There was the extreme variability noted previously with the most severe stuttering seeming to occur when he was talking about his drawings.

Spring was approaching and T.G. preferred to play outdoors. We began playing ball outside, and T.G. was throwing the ball as hard and fielding the ball as quickly as he was able. There was such exhaustion following the ball playing that he had to rest for varying periods of time. During these rest periods he began to talk about his pending three weeks at a summer camp. He was afraid that he would not make friends as people would not like him because he was 'crippled.' He seemed to be asking me for support. I told the child that people do not decide whether or not they like someone because of his physical abilities. They like someone because of the kind of person he is. It was mentioned that there are certain things he could do well even though he had the complete use of only one arm and leg. He has to look for the things he can do well. The word 'crippled' became less fearful to him. The child identified with the smallest tree outside, not only because of size but because several limbs were missing from it. T.G. would gather up sticks and bring them to the small tree, placing the sticks in various holes in the bark. He was bringing 'arms' to the tree. He began to peel the bark from the other trees and he began to kick the other trees. In time, however, he began liking the larger, stronger trees as well. He was not always able to decide which tree he liked best. The child was beginning to look forward to his camp experience. Therapy was discontinued when summer vacation began.

Status at End of Therapy. The number of repetitions was extremely meagre during the last three meetings. The mother stated there was improvement at home but that she was still aware of his repetitions. It is conceivable that with the clinician the repetitions have lessened because the child is able to discuss his feelings openly and because he receives the understanding and support which he needs. However, at home where there is still the tremendous competition with his brothers and where the child is seeking for approval from his mother, there is still insecurity and fear which are manifested in speech hesitancies.

SIDNEY GODA
Burke Foundation Rehabilitation Center

• Primary Stuttering in a 28-Year-Old Adult

'Primary stuttering' is a term used to refer to a child's speech which is characterized by frequent disfluencies (usually syllable or word repetition) and which occurs without evidence of self-awareness, avoidance, or struggle. Most authorities advise that these disfluencies will reduce to normal frequency with maturation if there is no labelling or if there is no stigma attached to them. If, on the other hand, attention is drawn to them, the child may develop 'secondary stuttering' involving fear and avoidant struggle behavior.

The following case is presented as an example of primary stuttering which began in adulthood and which did not develop into secondary stuttering.

Sergeant D_____ is a 28-year-old Caucasian male. He is married, the father of three children, a high school graduate, and has been in the military service for approximately 11 years.

He has held a variety of assignments in the military service. He was a combat soldier (machine gunner) in the Infantry during the Korean conflict and a recruiting sergeant in the Air Force for three years during which he gave many talks to civic, fraternal, and other groups. Until recently, he was stationed in Europe as an Air Force administrative clerk in a section whose primary purpose was to expedite the procurement of vital aircraft parts.

He first came to the attention of the medical staff when he reported in for 'sick call' one morning. He was visibly disturbed—trembling, crying, and 'stuttering' severely. He complained of the loud 'whining and howling noises' he had been hearing, noises caused by the hydraulic pumps and by jet engines being tested in a nearby building. On further inquiry, he stated that he had been 'overworking' for several months, having very little time to spend with his family.

On admission to the hospital his speech was characterized by rapid repetitions of initial syllables of words and prolongations of vowels, especially the vowel /æ/. The disfluency was pronounced at the beginning of sentences and tapered to fluency at the end.

The patient was administered a battery of psychological tests consisting of the Bender-Gestalt, Draw-A-Person, Sentence-Completion, MMPI, Wechsler Adult Intelligence Scale, and Rorschach. The psychological evaluation showed the patient to be a person of average intelligence (IQ 102) who was experiencing an acute anxiety reaction. Testing indicated that he was basically a passive-dependent person with introversion tendencies who used repression and withdrawal as primary ego defense mechanisms. Particularly noteworthy was his acute fear of being harmed by authority figures which he viewed in an hysterical and phobic sense. A large number of responses to the Rorschach of 'missing parts,' 'missing legs,' and 'missing heads' of both animal and human concepts indicated the presence of strong unconscious fears of being harmed and emasculated.

Several days later the acute signs of trembling, crying, and 'stuttering' abated and disappeared. It was noted that the patient had a mild tendency to 'stutter' automatically and without any evidence of anxiety. He would say, for example, 'I—I-I-I didn't like the long hours. It looks like—looks like I'll be here for a while, I never minded the re-re-re-responsibility.' He denied ever being aware of any speech problem until his present hospitalization.

The Sergeant became completely fluent approximately three weeks after his initial hospitalization and has remained fluent since. He has been returned to duty in a less stressful environment.

This case is presented with the purpose of illustrating that perhaps it is not advisable to consider that stuttering behavior 'begins' only in certain age groups and that it must be viewed within the framework of such rigid categories as 'primary' or 'secondary.' There may be many different factors operating, at different age levels, which result in excessively disfluent speech that can be, and often *is*, classified as

'stuttering.' It appears logical to assume that the similarities and differences in such speech behavior and the conditions affecting it should be described and evaluated in order to understand more completely the wide range of speech behavior that may be categorized within the single term of 'stuttering.'

VINCENT WALLEN

USAF Hospital
Eglin Air Force Base, Florida

• Stuttering in Families of Adopted Stutterers

The recent contributions on involuntary vocalization by Hejna (*J. Speech Hearing Dis.*, 25, 1960, 197; 26, 1961, 86-88) have demonstrated that clinical information which is diffusely scattered among workers in the speech and hearing field may be collected in significant amounts through the medium of the Clinical Forum. The following is written in the expectation that a similar store of information may exist on a different question.

One of the most basic issues upon which authorities are divided is that of the extent to which heredity contributes to the etiology of stuttering. For reasons which the writer has taken up in detail elsewhere (*A Handbook on Stuttering for Professional Workers*, Chicago: National Society for Crippled Children and Adults, 1959), this question has not been settled by accumulated information on the stutterer's constitutional make-up, on the familial incidence of stuttering, or even on the concordance of stuttering in identical twins. There is, however, at least one further test of the genetic hypothesis which would seem to be fairly conclusive and which has apparently never been carried out. It would appear to be necessary merely to determine the incidence of stuttering in the families of stuttering children who have been adopted shortly after birth. It may be taken for granted that a large proportion of such children will have stuttering in their family backgrounds simply because a large proportion (about one-third to one-half) of stutterers do. The crucial question, of course, is whether this stuttering background is to be found in their biological or adoptive families.

While there are obvious difficulties which stand in the way of investigation of the biological families of adopted children, this need not serve as a deterrent to work on the problem, since enough may be inferred from findings concerned with the adoptive family backgrounds alone to make the effort worthwhile. The great difficulty is the rareness with which adopted stutterers are encountered in ordinary clinical experience. In the last 10 years the writer has come across only five such cases, too few as yet to reveal the answer to this question clearly. This is written in the hope that readers of the *Journal* will correspond with the writer regarding additional cases of adopted stutterers of which they have knowledge.

Criticisms of the test suggested here are also invited. So far no compelling reason for skepticism about its validity has seemed to present itself, but the ramifications of the question are somewhat tricky. One reaction which has occasionally been expressed to the writer is that adopted children are not representative of stutterers as a group. It is true that parents who

adopt children may possibly, for one reason or another, provide a type of home environment making for unusually large or small numbers of stuttering children—assuming for argument's sake that the home environment is of major importance in the etiology of stuttering. But a moment's reflection will show that this is of little consequence. The only assumption which the study requires is that adopted stutterers, whether many or few, have the same amount of family background of stuttering as do other stutterers, and since all or nearly all of the adopted child's family background of stuttering, both biological and adoptive, has been determined considerably before his birth, this objection would not appear to be warranted. There are undoubtedly still further complexities involved in this question, and comments on them will be welcome.

A final word should perhaps be added about the five adopted stutterers seen so far by the writer. In four of the five cases there was no known stuttering in the adoptive families. The fifth case was a stutterer examined recently at age 8-6. He had been adopted at seven months of age. The adoptive mother said that she had stuttered severely as a school child. Her nephew, 18 years of age, was also said to be a severe stutterer. The mother had been a 'nervous child with many tics,' and as a parent described herself as excessively demanding. The child's stuttering had begun when he was four or five years of age, at a time when there were 'severe problems' in the family.

OLIVER BLOODSTEIN

Brooklyn College

Letter to the Editor

LIMITED FREQUENCY SCREENING

The authors of the article, 'Limited-Frequency Screening and Ear Pathology,' *J. Speech Hearing Dis.*, May 1961, wish to correct their reference to the Lawrence-Rubin study. The results of the latter study supported a limited frequency screening concept, but no combination of frequencies used was completely adequate in detecting hearing losses with medical significance. The authors apologize for their original misleading statement.

G. Donald Davidson

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INTERLINGUA

Authors who wish to submit summaries of their articles in Interlingua may obtain translations at a fee of $2 per 100 words from Division de Interlingua, Science Service, 80 E. Eleventh Street, New York 3, N. Y.

BOOK REVIEWS

ERNEST H. HENRIKSON, Editor

NOTE: *Authors whose books are reviewed in the* Journal of Speech and Hearing Disorders *are provided opportunity to comment, if they so desire, on the reviews of their books. Reviews and comments are published together. The Publications Board and the Book Review Editor intend this policy to facilitate informed and balanced book reviewing in the interests of the profession served by the* Journal. (*See* Journal of Speech and Hearing Disorders, *24, 1959, page 425, for the statement inaugurating this policy.*)

BARBARA, DOMINICK (Ed.), *Psychological and Psychiatric Aspects of Speech and Hearing.* Springfield, Ill.: Charles C. Thomas, 1960. Pp. 720. $19.50.

Publications discussing psychological factors in various kinds of speech and hearing problems, although fairly abundant, are widely scattered and in large part not readily available in breadth to students in any one of the several disciplines concerned with such problems. There has been a need for bringing together into one source the significant information which has accumulated about this broad area of interest.

The publication of *Psychological and Psychiatric Aspects of Speech and Hearing* does little to answer this need satisfactorily. First of all, the book is poorly organized and edited. It is divided into three parts: Part I, Psychological and Psychiatric Aspects of Normal Speech and Hearing (eight chapters); Part II, Psychopathology of Speech and Hearing Disorders (14 chapters); and Part III, Psychotherapy of Speech and Hearing Disorders (eight chapters). Beyond that, no systematic over-all plan is apparent and there is little evidence that one was intended. There is practically no internal organization: this reviewer could find only one instance in which an author of one chapter made reference to any other chapter in the book. There is no apparent effort at continuity or interrelating information within the book. It is simply a collection of independent papers, with considerable repetitiousness. Even the structural organization is not good; a number of the chapters are located in sections to which they are inappropriate. Several chapters are included which bear on diagnostic procedures and techniques, but this the reader must discover for himself since these chapters are sprinkled with apparent abandon among the three major sections of the book. There is extremely little integration of diagnostic methods and procedures, their findings, and their relevance to therapy except as this occurs occasionally in individual chapters—which, further, may have neither of these features as their principal focus. Only half of the chapters in the section on therapy have a direct pertinence to therapy, and the great bulk of this section is devoted to therapy in stuttering. There is no systematic treatment of therapy in hearing problems and, in fact, little mention of it at all in the entire book.

Although the title of the book indicates that it treats with psychological factors in hearing disabilities, there are only three out of 30 chapters dealing particularly with this topic. Further, only one of these (43 pages) deals specifically with functional etiology of hearing disabilities and this chapter, although a good one, is simply a reprint of an article published in 1948. (In many ways the book would have been much more valuable if it had consisted of a collection of such worthwhile articles.)

Too many of the contributions give too much space to a belabored review of the basic or fundamental character of speech as a distinctive human function. Generally there is also an impressive lack of objective or experimental supportive data and, at the same time, insufficient use of elucidative case material. Several of the chapters consist of such expansive ruminations that one is led to feel that those chapters might more accurately have begun their titles with 'Reflections on . . .' to indicate their nature. In other chapters the material presented, while potentially significant, is laid out almost in outline form with little or no effort made to give it an internal consistency or to integrate it toward a focus of application.

The book has some highlights. The second chapter, 'Speech as Influence,' is of the more scholarly and substantial type one would

hope to find in a worthwhile book of this kind; it is well-organized and presented, with well-chosen references, and salvages the inauspicious impression created by the first chapter. The chapters dealing with speech development are largely narrative descriptive accounts of what one sees in speech and language growth concurrent with the psychological development of the child; yet a wealth of basic background information is presented in the chapter on 'Maturation and Speech Development' (reprinted from *Logos*), supplying leavening for other more 'dynamic' essays in the book. The contributions on schizophrenia and aphasia are admittedly brief, but they contain sound fundamentals and have good references. In the chapter 'Voice and Personality' the principles discussed are developed with due care and objectivity, the documentation is excellent, and the citations carefully appraised. The selection on 'Voice and Articulation Disturbances' merits a similar accolade. The chapters by Glasner and Gottlober on stuttering therapy are particularly worthwhile. In a very brief space Gershman gives an excellent account of the function and significance of dreams. There are a few other chapters which rise above mediocrity in varying degree but which for adequate review would require considerable individual comment to sift what is valuable from what is incomplete, inadequate, or misleading.

Over all, one wonders what, if any, particular audience the editor had in mind in compiling this book. One may say that whatever the target group might be, the result can be no better than a near miss. In essence, to learn much of merit from this book, the reader should already have a fairly broad sophistication in the field or be guided by someone who has. As a single source for directed reading, it should have some value.

M. E. Wingate

University of Washington

Author's Comment: After reading the above, I question whether the reviewer fully understood or agreed with the over-all purpose of this collected volume. As stated in the preface, it is: 'This volume is primarily a serious attempt to foster the understanding and knowledge of the psychological processes involved in the origin, comprehension, and treatment of speech, hearing, and communication disorders. . . . In order to insure a broad, eclectic viewpoint, we have pooled the various disciplines, including psychiatry, speech therapy, speech teaching, psychology, neurology, and social work.'

The limitations he mentioned are possibly inherent in the task of collecting the writing of 20 fine experts in varied fields. I might also question why the reviewer chose to ignore all three of the chapters authored by the editor of the volume.

Dominick A. Barbara

New York City

Beckman, Gerd, and Schilling, A., *Hörtraining (Auditory Training)*. Vorwort by J. Berendes. New York: Intercontinental Medical Book Corp., 1959. Pp. 123. $5.70.

The subtitle (in translation) of this scholarly monograph is 'History, Fundamentals, Methodology, and Prognosis with Children and Adults.' According to the authors, it is written from the otologist's point of view and is published as the fourth in a series of monographs in otolaryngology.

The content, however, belies such a restricted viewpoint. On the contrary, this slim volume (123 pages) takes on the aspect of a combination textbook and reference book for specialists in aural rehabilitation, dealing authoritatively not only with underlying concepts but with detailed and specific clinical procedures including word and sentence lists, prognostic and achievement tests, etc.

The book is divided into four main parts. The first contains a thorough historical review of the education of the deaf since Aristotle, with special emphasis on the use of residual hearing and including a description of modern auditory training facilities and practices in the United States, Denmark, England, Holland, and Sweden.

Part 2 concerns itself largely with acoustic and physiological phonetics, speech intelligibility, and selection of speech materials for auditory training. Graphic illustrations of vowel formants and consonant spectra are included. In the discussion of speech intelligibility, a good deal of stress is placed on the distinction between peripheral and central functions in the perceptual process. It is pointed out that the benefits of auditory training are associated exclusively with central processes and that disturbances of the analytic functions of the end organ and auditory nerve cannot be ameliorated through acoustic stimulation. This view has led the authors to reject the use of too analytical an approach to auditory training and to emphasize instead the importance of retaining

normal rhythmic patterns and inflections and to develop interpolative skills in listening to contextual speech.

Part 3 takes up incidence, etiology, and assessment of hearing impairment in children, and detailed steps and procedures in the aural habilitation of these children, according to age groups. The various methods for testing the hearing of infants and preschool children are described, including 'peep-show' and other forms of play audiometry, electrodermal and electroencephalographic techniques, picture card speech reception testing, etc.

The coverage of auditory training methods is quite thorough, extending also to parent counseling and home programs and the like. It is interesting to note that the authors advocate avoidance of speechreading development until after auditory orientation has been established.

The fourth and final part parallels the third, but with application to adults.

Over all, this is a very well-written, clearly organized, and concise monograph that would be well worth translating into English so that it may become a part of the library of everyone who concerns himself with aural rehabilitation. While the materials presented could, naturally, not be directly translated, the principles on basis of which the material was selected are outlined by the authors and could presumably be used as a guide in the selection of suitable English materials.

Otto J. Menzel

University of Miami
School of Medicine

Authors' Comment (Translated by Professor Herman Ramras, Chairman, Department of German, University of Minnesota): The present monograph *Auditory Training* was written by me in collaboration with Dr. A. Schilling on the basis of many years' experience at the University Ear, Nose, and Throat Clinic, Marburg-Lahn. Professor Dr. J. Berendes, Director of the Clinic, wrote the introduction. The monograph appeared in a scientific series of *Ear, Nose, and Throat Medicine*, and for this reason the scope of the monograph had to be limited. The authors would have liked to present this important area in greater detail, particularly in view of the fact that there is still need for greater development of the knowledge and practical implementation of hearing training. The idea of the monograph was to give a survey for this purpose, and to advance further application.

An important goal which we are striving for is the improvement of team-like cooperation among otologists, audiologists, and technicians. Since there are no separate auditory centers in Germany as yet, it is at present the task of the audiology and phoniatric divisions of the big ear, nose, and throat clinics to cooperate in hearing rehabilitation.

Our experience that reading instruction should begin only after some progress in hearing training applies particularly to children who do not begin hearing training until the ages of five to seven. Since these children usually have some ability in lipreading, they often do not wish to concentrate on the slight auditory residues (vestiges). In such cases it may be more advantageous to eliminate lipreading at first.

G. Beckman

Marburg/Lahn

Carrell, James, and Tiffany, William R., *Phonetics: Theory and Application to Speech Improvement*. New York: McGraw-Hill, 1960. Pp. 361. $7.75.

This text clearly and simply but comprehensively deals with phonetics. It is rich in illustrative material such as articulator placement diagrams; it contains many lists of words exemplifying sounds and more transcriptions than may be found in any other phonetics text save one. It is particularly useful in a beginning undergraduate phonetics course.

The stated intent of the authors is to meet the needs of: (a) those who seek to improve their personal usage of English, (b) those to whom English is an additional language, (c) speech and hearing clinicians entering practice, and (d) potential experimental phoneticians or linguists who may choose to continue in this field. To this end the authors provide (a) a careful analysis of basic principles of phonetics, i.e., the sounds of English and the ways in which such sounds change in connected speech; (b) abundant practice material to train the student in accurate perception of speech patterns in individual sounds and in context through analysis of superior and substandard speech samples, and (c) frequent and careful reference to research in the field plus an excellent bibliography for the student who wishes to use this book as a stepping-stone toward more advanced studies. The authors have been singularly successful in being accurate but not so technical as to frighten the beginning student.

The traditional analysis of the International Phonetics Association alphabet in both broad and narrow transcription is used in the practice material because the authors feel it is 'better adapted for a simplified treatment, particularly for those whose native language is English or for those who have already learned English in the traditional way' and because 'I.P.A. notation conforms to the usage and symbol systems most widely used in phonetic literature.'

The merits of this text are many. Practice material is abundant. It routinely includes for any given sound: (a) common spellings, (b) discussion of production of the sound, (c) its pronunciation, (d) lists of words employing the sound in various positions in the words and in stressed and unstressed situations and contrasted with other sounds, (e) many different kinds of practice material phonetically transcribed.

The schematic representations by diagrams of articulator adjustments for various sounds are unusually well done. Terms peculiar to this field are used liberally and are always clearly defined. In a natural and unlabored way the authors refer to more academically advanced material. There are excellent discussions of such matters as regional differences in speech, the usefulness and limitations of standard dictionaries, history of the English language, and the subsequent gap between written and spoken language.

Phonetic transcriptions are many, varied, highly contrasted, and progress from broad to narrow. The first series, written in General American speech (Appendix A) is taken from periodicals, essays, addresses, autobiographies, plays, and novels. Samples of speeches of public figures (Appendix B) include contrasting American dialects. A third series (Appendix C), which adds samples from professional readers, actors and students, provides even greater dialectal differences (such as Wendell Wilkie vs Queen Mother Elizabeth of England) and employs pause marks. Finally, the last examples (Appendix D) provide narrower transcriptions with more detailed modifying symbols and pitch notations.

Chapters 12, 13, and 14 are particularly useful to the potential speech and hearing clinician. Chapter 12 covers 'The Dynamics of Sounds in Context,' an analysis of changes which take place in sounds when put in connected speech, i.e., the effect of *movement*, of consonants on vowels, of *assimilation*, of *blending*, of *juncture*, and of *stress*. Prosodic elements of speech (Chapter 13) are discussed under pitch, quality, loudness, and duration. Speech improvement covers regional-dialect differences, sources of substandard speech, and steps in a speech improvement program in Chapter 15.

Lest the price of the text be questioned ($7.75), it should be pointed out that previously an instructor had to request the purchase of a text *and* a phonetic reader. Now both needs are met in one volume. Quality of paper is excellent; print is highly readable; proofreading and indexing have been carefully done.

A few minor suggestions might be made: (a) In descriptions of placement of the speech organs such terms as *lingua alveolar* or *lingua palatal* seem tautological since the sounds described must of necessity be lingually initiated. (b) A glossary of terms would be particularly useful to the speech and hearing clinician and to the student specializing in this area. (c) Since in many colleges and universities, phonetics is required for *all* majors, including those in radio, TV, and theatre, one might suggest an additional appendix of play, radio, and TV cuttings written in the dialects most often presented on stage or over the air. (d) A short chapter on the historical development of the science of phonetics might give this subject added stature in the eyes of the student.

SUE EARNEST

San Diego State College

Authors' Comment: The authors are grateful to Dr. Earnest for her comments and for her willingness to undertake the task of preparing this review.

JAMES CARRELL
WILLIAM TIFFANY

University of Washington

DECKER, FRIEDA, *Progressive Lessons for Language Retraining*. New York: Harper, 1960. Four loose-leaf workbooks.

This publication is a series of four workbooks whose purpose is to help speech clinicians 'accomplish rehabilitative goals with their expressive aphasic patients.' Each workbook consists of seven lessons, similar in format and containing drill activities familiar to the aphasia therapist, e.g., copying words in association with pictures, reading simple sentences, writing answers to questions, copying and tracing words, letters, and numbers. Each lesson is about 10 pages

in length and employs large clear type and generous spacing. This results in a relatively small number of drill activities. The books consist of loose-leaf pages in a manila folder, which permits flexibility and ease in removing and rearranging lesson materials. The pictures and illustrations are black and white line drawings which are clear and easily interpreted.

The paucity of exercises would be a drawback if the books were offered merely as a collection of drill materials and exercises for the aphasic; however, this is not the author's intent. The workbooks are offered to implement the suggested approach to aphasia therapy which is to provide the aphasic with a familiar 'real life' situation through the medium of role-playing and to center the therapy activities and exercises (described above) around this experienced situation. The speech clinician begins the lesson by 'setting up a therapeutic theater in the tradition of psychodrama' and attempts to get the patient to assume a role that was his pretraumatically in common family situations. Action and props are used to aid the patient to experience his role emotionally as well as intellectually. This experiencing of the role is intended to facilitate and stimulate the recovery process aided by the more formal language retraining activities illustrated in the workbook. The vocabulary, pictures, questions, and reading material for the lesson center around the theme of the experienced situation.

Each workbook is organized around a general theme concerning the activities of the Day family; each of the seven lessons of the book deal with some aspect of the general theme, e.g., Book I, The Days at Home, consists of the following lessons: We wash the car, We work in the yard, We set the table, etc.

The author suggests the following method of administration of the lesson: Each lesson is introduced with a picture of the total familiar situation to be enacted; the vocabulary of the situations is rehearsed by reading it in unison with the clinician and matching pictures. Next, the 'drama' and the 'role-playing' begin, which turn out–somewhat disappointingly–to consist of the aphasic reading along or in unison his role from a prepared script of five or six sentences of about second-grade reading difficulty. The other exercises of the lesson then follow. This is somewhat less than the dynamic approach one is led to expect from the use of the terms 'role-playing' and 'psychodrama.'

In general, the material is of fairly elementary nature in form and content and most appropriate to patients functioning on a low level of language ability. The lessons do not provide activities graded in difficulty to meet improved language functioning with recovery. Some may consider the content of the lesson inappropriate to the mature interest of an adult, albeit he is aphasic.

The nature of the disorder of aphasia foreordains a limit to the value of any type of drillbook with its preselected and limited material. Realizing this, the author warns the user of the workbooks that 'each reality event presented in the workbook is but a mere suggestion, or a beginning point, from which the speech therapist can expand in several directions' and 'their use and timing will require professional understanding, judgment, and patience on the part of the aphasia speech therapist.'

Ultimately, the value of the workbooks depends on the degree to which they achieve their purpose of facilitating language recovery of the aphasic; this can be determined empirically only by their use and evaluation in the clinic setting and not by an armchair analysis. (The present review is based on a reading of the materials only and not on their use in a therapeutic situation.) The author's suggested approach to aphasia therapeutics deserves consideration and trial by aphasia clinicians.

ROBERT J. DUFFY

Palo Alto, California

Editor's Note: This review was sent to the author, but no comment was submitted.

DE WEESE, D. D., and SAUNDERS, W. H., *Textbook of Otolaryngology*. St. Louis: C. V. Mosby, 1960. Pp. 464. $8.75.

This textbook 'is designed primarily for the medical student and the general practitioner.' The authors are well-qualified to present such a text. Dr. DeWeese is Clinical Professor of Otolaryngology in the University of Oregon Medical School and a member of the American Board of Otolaryngology. Dr. Saunders is Associate Professor of Otolaryngology in the Ohio State University College of Medicine.

The book contains 32 generously illustrated chapters grouped, except for the first one and the final six, according to anatomic region. At the end of each chapter is a list of 'selected readings.' Not being an

otolaryngologist, the reviewer is not competent to evaluate any of the chapters except those dealing with audiometry, speech disorders, and nonmedical rehabilitation of the deaf. A large part of this review, therefore, will consist of uncritical listing of chapter content. The first chapter, the longest in the book, is a systematic step-by-step guide to the E.N.T. physical examination. The next four chapters cover lesions of the oral cavity, diseases of the pharynx, tonsils, and adenoids, and diseases of the nasopharynx. Three chapters are devoted to the larynx—its anatomy and physiology, laryngeal paralysis, nonneoplastic conditions and laryngeal tumors. Three chapters, including one on tracheotomy, are given to bronchoesophagology. Following a general chapter on the nose and paranasal sinuses, nosebleed is given a chapter of its own. The nasal septum, rhinoplasty, and maxillary and nasal fractures are treated in a single chapter. Three chapters are assigned to diseases and tumors of the nose and sinuses.

Nine successive chapters deal with otology. The first two of these review the anatomy of the ear and the physiology of hearing. The next chapter, called 'Modern Audiometry,' contains a few statements in its 16 pages which might elevate an eyebrow or two of some readers of this journal, for example: 'The Weber test does not "lateralize" in a completely quiet room . . . While one ear is being tested [whether by AC or BC], the opposite ear must be masked. . . . Audiometers are equipped with a masking sound (a mixture of frequencies sometimes called "white noise"). . . . a loss which is greater by speech audiometry [SRT] is especially characteristic of diseases affecting the organ of Corti.' Readers who respect audiogram conventions are likely to be offended by the horizontally stretched forms which appear in the book. Little is said about the problems of testing young children. Despite such possible flaws the reviewer feels that the coverage of audiometry is not a bad effort at a difficult task.

The five chapters following the one on audiometry treat the nonauditory labyrinth, abnormalities of the external ear, the tympanic membrane, diseases of the middle ear and mastoid, and etiology and treatment of various types of hearing loss. Included in the latter chapter is a puzzling audiogram showing BC losses of 85 db. Equally strange are several audiograms which show BC losses considerably greater (35 db in one case) than AC losses. The otological section ends with a chapter on tinnitus.

Chapters 27 and 28 are of particular interest to readers of this journal for they deal with speech disorders and nonmedical rehabilitation of persons with hearing loss. The chapter on speech disorders, attributed to DeWeese and Herold Lillywhite, is a slightly revised version of an article written by the latter for the *Journal of the American Medical Association* (167, 1958, 850-858). It briefly reviews normal speech and language development and conditions which commonly cause speech disorders, and concludes with a section on the 'relationship between the physician and the speech pathologist' and one on 'the professions of speech and audiology.' The chapter on audiologic rehabilitation is a four- or five-page coverage of hearing aids, lipreading, and education of the deaf followed by an enumeration of some agencies concerned with rehabilitation. It is unfortunate that this chapter includes in its second paragraph the following misleading sentence: 'Under the guidance of otologists, and with the help of educators of the deaf, medical schools, and communities, training has been given to a large number of audiologists, speech therapists, and speech teachers.' Of the many audiologists, etc., whose histories are known to the reviewer very few trained in this country could be said to have received their training 'under the guidance of otologists.' The only otologist known to this reviewer who might be said to have 'guided' the training of an appreciable number of audiologists is the late Max Goldstein of Central Institute for the Deaf.

The final four chapters treat subjects which the authors evidently felt would not fit the framework established for the earlier chapters. The subjects covered are dizziness and vertigo (on which DeWeese once wrote an entire book), the facial nerve, the salivary glands, and cysts and other tumors of the neck. The index which follows appears to be fairly complete.

It has occurred to the reviewer that it would not be amiss for an audiologist or a speech pathologist to own a book on the fundamentals of otolaryngology. Such a book —whether it be the one under review or another of comparable scope such as Lederer and Hollender's, Boies' or Morrison's—could be read to advantage for background. Subsequently it would serve as a handy reference.

CHARLES LIGHTFOOT
University of Illinois College of Medicine

Editor's Note: This review was sent to the authors but no comments were submitted.

ECROYD, DONALD H., *Speech in the Classroom.* New York: Prentice-Hall, 1960. Pp. 150. $5.25.

Purportedly, the contents of *Speech in the Classroom* are directed to the classroom teacher in training in an attempt to help develop personal speaking skills and to provide insight into the kinds of speaking problems that an elementary or secondary teacher will encounter in the classroom. The book is divided into three sections: The first deals with voice production, diction, expressiveness, posture, gestures, and materials and their arrangement. The teacher's speech is the topic of section 2 and deals with oral reading, storytelling, expository speech, demonstrations, the use of visual aids, conferences with students and parents, and kinds of class discussions. Section 3 is 21 pages long. The first two chapters in this section attempt to cover aid for the speech handicapped and help for those 'who already have good speech skill.' The last chapter of this section, which in this reviewer's opinion should have been the first chapter of the book, is entitled 'Speech Can and Should be Taught by Every Teacher.'

The author recognizes that a selective factor operates in a teacher training program in that not too many people with obviously substandard speech elect to prepare to become classroom teachers. Thus, a radical approach to personal speech improvement is not always necessary nor is it attempted by the author. This reviewer feels, however, that the title *Speech in the Classroom* implies an approach that is not covered by most texts concerned with public speaking skills. It seems to imply that the reader will find a substantial discussion of the problems of speaking encountered in the classroom—not necessarily speech problems but problems centered around speaking—and not only teachers' problems in speaking but the pupil's problems as well. On reading the text, however, one finds that the discussion is primarily teacher-centered and that means for meeting the needs and approaches to building requisite speech skills of children is given only incidental consideration.

This material is apportioned among 14 chapters which average 10 pages including illustrations. Unfortunately, the attempt to cover so much ground in so short a book forces oversimplifications and overgeneralizations. In terms of personal speech improvement the reader is usually offered the choice of listening more carefully to the speech of others or to self-listening and introspection. In the nine pages concerned with the speech handicapped, the author describes various types of speech problems and urges referrals to a medical consultant, a speech clinician, or a psychiatrist, but little help is provided for differentiating among these referral sources. In another special chapter, the author appeals to the prospective teacher to remind the gifted speaker of his stewardship regarding his speaking ability.

Several misleading and inaccurate statements are to be found in the text, for example: 'When the ear receives any sound wave, it reacts with *sound,* translating the frequency as pitch, the amplitude as loudness, and the wave composition as quality.' 'Yawn. Put your hand on your Adam's apple. Now yawn again. Do you feel the larynx drop and the pharynx expand? This is the position the throat assumes when you correctly produce a big voice.' 'It is possible to have a cleft palate without having a hare-lip, but it is not possible to have a hare-lip without having a cleft palate.'

In an exercise to help check the clarity with which the reader produces the 'little bit of difference' that makes good clear speech, the reader is required to contrast such pairs as 'wed-red, wake-rake' and 'wet-let, weed-lead.' A drawing of a mechanism to represent sound waves graphically is questionably titled 'The Oscilloscope.'

Only a small number of references are made to the voluminous literature in speech concerning the topics touched on in the text. What references are made, however, are carefully annotated. Nowhere is the prospective teacher told of the important work being done by the members of these professional organizations with the noted exception of the ASHA. Although the American Speech and Hearing Association is mentioned briefly, only two journal articles published by the various professional organizations in speech are mentioned, one from the *Quarterly Journal of Speech* and one from the *Southern Speech Journal.*

It is this reviewer's opinion that the author has attempted too much in too short a space and as a consequence has only partially accomplished his objectives.

ROBERT L. MULDER

Oregon College of Education

Author's Comment: I suppose that anyone who has ever written a book develops a certain measure of patriotism for his own prose. There is an element of proud posses-

siveness which cannot be rationalized, and it provides a definite 'to me' context for anything the author would say. With that fact firmly in mind, I am—to coin a phrase—reluctantly delighted to add a few words to Dr. Mulder's comments.

First of all, although I bristle at his 'purportedly,' his first paragraph does state what I had in mind. I have been teaching for over 16 years now, and much of that time I have been responsible for a 'one-shot,' required course in speech for students in the various educational curricula. Unless these students were speech majors or minors, this one course (10 short weeks on the quarter system; only 16 in a semester) was generally all that they took. Over the years, therefore, I have conducted an informal but extensive interview-type probe to seek out the kinds of things teachers in the field who are not speech trained want to know.

Teachers have told me repeatedly that they have certain speaking jobs which they regularly perform in their classrooms. Therefore, it is these things which are covered in the book, and not such formal materials as are usually found in a more standard public speaking course. Also, throughout the book I have operated on the assumption that any skills which one masters for himself on grounds other than mere intuition, he can usefully explain to others. Thus, throughout the book are scattered paragraphs suggesting ways the teacher can use his own background of understanding to stimulate improvement in speech skills among his students.

The 'gifted' and the 'handicapped' (I hate both of those words: like 'togetherness' they should be banned!), however, require special thought; hence, separate chapters. The chapter on the speech handicapped suggests common pathologies likely to be seen in an ordinary classroom and encourages the teacher to seek aid, but also points out that there is much he can do by giving the child a sense of belonging and worth. After all, it *is* a person who speaks. For the truly handicapped, however, no suggestion is made for specific therapy because I firmly believe that speech correctionists are trained, not born, and that you cannot deal with stuttering theory in two paragraphs.

The use of 'oscilloscope' for 'oscillograph,' the error about the cleft lip, and the semantic questions about how serious 'l' and 'r' substitutions are and about whether it is the ear or the brain which makes the psychological interpretation of the sound-wave will be dealt with in the next printing. I had spotted them, too. According to my own experience, however, and according to the literature I can find, the larynx *should* be kept low when you 'correctly produce a big voice.' (See Van Riper and Irwin, p. 239, for a suggestive comment on the relation of a high larynx and voice problem.)

I did not intend this book to take these students into the literature of our field, nor do I conceive of them as potential members of our associations or readers of our journals. My deliberate choice was to write briefly and concisely about the speech tasks of the nonspeech teacher, because—willy or nilly—he teaches speech. I know the book is teachable, for it is substantially the result of years of teaching on my own part, and on the part of teachers working with and under me in courses of this type. I consider it functionally oriented rather than research oriented. I trust it is clearly written for the most part; and I hope it will prove useful within the context for which it is intended.

DONALD H. ECROYD

Michigan State University

EWING, IRENE R., and EWING, Alex W. G., *New Opportunities for Deaf Children*. Springfield, Ill.: Charles C. Thomas, 1960. Pp. 145. $4.75.

'We have written this book to replace our earlier book *Opportunity and the Deaf Child*. Since that book was written, in 1945, there have been developments that offer new and better opportunities for children with impaired hearing. In writing this new book it was our aim to show how parents and teachers can make use of new knowledge and equipment in the home and in schools. We hope that this book will also be useful to doctors, in particular to school medical officers, the staffs of maternity and child welfare services, audiologists and educational psychologists.' So state the Ewings in the preface to this their latest contribution to the growing literature concerned with hearing handicapped children.

Chapter 1 sets forth the plan of the book. In it the authors are more specific as to their objective. 'The aim of this book is to make plain to parents of children who are handicapped by varying degrees of deafness how they [the children] can be helped [by their parents], at each stage, from infancy to adolescence, to be increasingly integrated into family life and ordinary society.' This theme recurs throughout the book.

In Chapter 2, 'Deaf Children and the World of Sound,' examples are given to show how a child with a hearing loss perceives—or fails to perceive—his acoustic environment. The development of an awareness of sound, or vibration, and the meanings to be attached to whatever he 'hears' are briefly sketched from shortly after birth to age five or so. In this chapter also the authors introduce certain terms which they use to categorize roughly degrees of hearing impairment: 'partially deaf,' 'severely deaf,' 'profoundly deaf,' and 'sub-totally deaf.' Mingled with their descriptions of the problems encountered by children having various degrees of hearing loss are discussions concerning the urgent need for, and limitations of, a hearing aid for the infant with a hearing defect. The Ewings, who have championed amplification for children for many years, continue their campaign with unabated vigor. Early use of a hearing aid is a second theme developed extensively in the remainder of the book.

In 'Deaf Child and Ordinary Child,' Chapter 3, is an elaboration about the development of a 'deaf' child compared to a normally hearing one during his first few years of life. The Ewings detail comparisons and contrasts in the physical, emotional, and social growth of these children, and in doing so reveal their highly developed sensitivity to the similarities and differences to be found. The differences, the authors point out, can, of course, be reduced with use of a hearing aid during the deaf child's formative years.

'The Ascertainment of Deafness in Infancy and Early Childhood' is the subject of Chapter 4. 'Screening tests' are outlined for four age groups: 7 to 9 months, 10 to 15 months, 16 to 30 months, and 2½ to 5 years. The procedures include 'test items' of common and easily produced noises, speech sounds, and games. Special attention is given to sound localization as an aid to evaluation. The authors discuss certain precautions to be taken by the examiner so that the effect of localization can be properly interpreted.

Chapter 5 covers the 'Diagnosis and Assessment of Residual Hearing.' Parents should find very understandable the authors' discussion of the nature of speech sounds and the effects of various hearing losses upon the perception of those sounds. How a loss will distort the hearing of other common sounds and noises, and how a child will react to these distorted sounds are considered in some detail. Audiologists will find the terms 'intensity,' 'loudness,' and 'decibel' used rather loosely in some instances, but many basic principles of hearing evaluation in children are clearly explained. On the subject of testing (as with many other points discussed throughout this book) the reader is referred by the Ewings to their *Educational Guidance and the Deaf Child*, published in 1957.

In Chapter 6, 'Hearing Aids at Home and at School,' the authors develop more fully their thesis that amplification, properly handled, can be of help to a child with almost any degree of hearing loss, even the 'subtotally deaf.' The authors have explored with considerable detail various electrical and acoustical aspects of amplification without being so technical that the lay reader would miss their points. Again, as throughout their book, the Ewings have revealed their tremendous insight into the world of imperfect sound in which the hearing handicapped live. Of particular interest to this reviewer is the discussion of 'loud-speaker batteries' apparently used to a considerable extent in England and other European countries. It is said that 'the loud-speaker batteries can, if required, reproduce music at sound-pressures to a maximum of not less than 120 decibels without distortion.' Children with even the most severe losses are said to sense the rhythms of music reproduced through these systems and learn to dance. Although reproduced music for the deaf is used to some extent in the United States, it is possible the technique has not been exploited as fully as it appears to be across the Atlantic.

'Parent Guidance and Home Training,' Chapter 7, provides many practical suggestions for both parents and teachers. Included is a section that deals with the function and importance of 'gesture' as contrasted with 'signs.' The parents' role in the training of their hearing handicapped child is emphasized in considerable detail.

In Chapter 8, 'Preparation for School,' the authors again reveal their highly developed sensitivity to the thinking processes, moods, impressions, and reactions of a child with a hearing loss. Separation from home and parents to attend a boarding school can be a traumatic experience, so the child must be made confident that '. . . his mother and father and home are still "there."' Numerous suggestions are provided that can help to instill assurance and self-confidence during this phase of the child's training.

Chapter 9 (43 pages) is a presentation of eight 'Case Histories,' of which seven have been prepared by the parents of the children reported, and one by the subject himself, now an adult. The histories are, therefore, strictly narrative and nontechnical. Most of the reports reveal the families were of sub-

stantial means, capable of providing their children with a wide range of experiences, opportunities, and facilities. Furthermore, the authors state, 'All these patients, as children, were found to have at least average or better than average mental ability.' Although the authors probably did not plan to provide a truly representative sample of the population of hearing handicapped children, at least one case illustrating the difficulties to be encountered when the potential is limited may have been in order. A lay reader might, it seems to this reviewer, be led to believe parental diligence, wise counselling, and proper training with a hearing aid will inevitably prevent a failure. Just one example of a disappointment would, perhaps, render this chapter a little more realistic.

The final chapter, 10, discusses present 'Schools' for the deaf in England. Several classifications are described, for example, special boarding schools, special day schools, private schools. Trends in the development of audiological facilities within the framework of schools for the deaf are also discussed.

In summary, this book makes very plain how parents can help their hearing handicapped children become '. . . increasingly integrated into family life and ordinary society.' This was the aim of the authors. They have succeeded well. The broader audience to which they have addressed themselves in the preface, the doctors and medical welfare workers, audiologists and educational psychologists, will also find much here for thought and reflection. It is not a cookbook for therapy, but an insightful guide to parents, teachers, and therapists which can help them develop the maximum inherent potential of a child with a severe hearing loss.

J. L. Shapley

Seattle VA Hospital

Author's Comment: The University of London Press now has in hand a second edition of this book. Changes have been made in the screening tests of hearing of babies and young children, in keeping with the development of them by the late Lady Ewing. The present practice of them in the University Department of Audiology and Education of the Deaf, and clinics associated with it, has been described. An account has been given of a new method of speech-hearing-teaching, evolved by one of us, that has proved very successful as a means of teaching profoundly deaf children to talk well. Later, we hope to publish the results of a long-term follow-up of a cross section of home-trained deaf children by D. A. Sanders, a scientific research assistant in our department provided by the Medical Research Council. His main finding is that they show a significant trend to be superior in later as well as earlier linguistic development to deaf children who have not had early home training. During many years the staff of the University Department has always had in hand, at any one time, a number of specific researches. There are at present 14 of these. Some 600 new cases of deafness in childhood are referred annually to the University Audiology Clinic and many more are seen in hospital and public health department clinics in which we collaborate. The aim of *New Opportunities for Deaf Children* is still to tell parents in everyday language about those of the findings of our team that are important to the preschool training of their deaf children. This continues to be based on the principle of helping parents to train their children at home. One of the functions of the book, therefore, is to supplement guidance to parents given in our clinics. Statistically based reports of our investigations continue to be published in other books and in articles in scientific journals.

Alexander Ewing

University of Manchester

Harkins, Cloyd S., Harkins, William R., and Harkins, John F., *Principles of Cleft Palate Prosthesis.* New York: Columbia University Press, 1960. Pp. 219. $12.00.

Anyone informed in the area of cleft palate rehabilitation will find this carefully documented and well-organized book of interest and value. Even though, as the author points out, it is intended primarily for dentists who are interested in constructing prostheses for cleft palate patients, surgeons and speech pathologists should also profit from an exposure to this work. Dr. C. Harkins has obviously reached his majority in his profession, and the book reflects his long experience, superb technical skill, artistry, and human warmth.

The book is divided into 22 clearly defined chapters dealing with the prosthedontist's initial case work-up, making of preliminary impressions, construction of study models, construction of aids for various types of unrepaired and repaired patients, special procedures for infants and young children and

for patients with acquired clefts. There are detailed discussions of criteria for corrective surgery in certain problem cases which should be especially helpful to dentists working closely with surgeons. The chapter dealing with the construction of an expansion prosthesis for infants with bilateral cleft lip and palate should probably be reprinted for circulation among cleft palate teams and used as the basis for professional philosophical discussions. This is an aspect of treatment that needs further exploration and seems to offer some hope of improvement in preoperative management.

Some readers, including this reviewer, will find some sections of the book open to discussion and to disagreement. The authors seem to be concerned about disasters associated with 'early' surgery and recommends prosthetic intervention and the delay of surgical closure until about age six. There is much in the literature and in clinical experience to suggest that this degree of conservatism may not be desirable for many children. The chapter on speech therapy written by Mrs. Maria Nitsche does not include research background or very much in the way of ideas for clinical management. Many would quarrel with the idea that speech disorders are necessarily a part of the cleft palate child's clinical picture. However, these are minor problems pointing to the fact that professional people do not always agree absolutely but not in any sense detracting from the value of Dr. Harkins' monumental contribution to the understanding of the role of prostheses in cleft palate rehabilitation and to the dentist who must build them. *Principles of Cleft Palate Prosthesis* will, without doubt, be adopted as a basic text in many prosthetic training programs and will find a valuable place in the private libraries of people concerned with the cleft palate patient.

Betty Jane McWilliams

University of Pittsburgh

Authors' Comment: The practical rather than the academic approach was deliberately employed in the composition of this book. Therefore, certain aspects, although recognized and comprehended with appreciation and respect, were intentionally excluded.

The presented concepts, contents, and illustrations, based on practical aspects, were primarily intended for dentists and this includes the chapter on speech therapy written by M. Maria Nitsche.

This book contains 249 illustrations, 165 of actual patients. Any reader, practically or academically oriented, can refer to the chapters on postoperative treatment to view the illustrations (few among many that could have been used) to understand the authors' tenet that surgical palatal closure be postponed until age six. The authors consider the word 'precaution' to be more appropriate than 'conservatism' in reference to this clinically supported belief.

The approach, contents, and concepts of this book may arouse some disagreement as the reviewer declared and demonstrated. Her opinion 'that professional people do not agree absolutely' is shared by the authors who are aware that progress occurs because they do not.

Cloyd S. Harkins
William R. Harkins
John F. Harkins

Philipsburg Cleft Palate Clinic

Jones, Morris Val, *Baby Talk*. Springfield: Charles C. Thomas, 1960. Pp. 96. $4.50.

This book is written for parents. It is designed to help parents determine whether a child's 'baby talk' is within normal limits or should be a cause for concern. Four solutions to the problem are presented with the following chapter headings: 'Seek Professional Help,' 'Increase Speech Stimulation,' 'Eliminate Other Causes,' 'Do It Yourself.'

The author encourages parents to seek professional help, indicates where the help may be obtained, and describes typical public school and clinical programs. The suggestions for increasing speech stimulation are specific and sound. The chapter dealing with the elimination of other causes emphasizes environmental causal factors. The author discusses aspects of the emotional climate of the parents which this reviewer has found to play a significant role in the cases of 'baby talk' seen in his clinic. The instructions to 'Do It Yourself' present a sequence of steps, with appropriate lists of teaching materials, that are commonly used by speech clinicians themselves.

Throughout the book, brief quizzes (11 in all) are presented to assist parents in determining the nature of the problem and analyzing related environmental factors. The questions are excellent, and possible answers are discussed in an appendix. The reader is reminded to refer to the appendix only once. The quizzes would seem more mean-

ingful if reference to the appendix were suggested each time a quiz was presented.

The book is easy to read and well-suited to parents. It will be an excellent one for speech clinicians to recommend to parents. However, this reviewer feels that the book will have its greatest usefulness as a supplement to conferences with parents. This reviewer has found that most parent-guidance material needs periodic interpretation. Despite its excellence, parents would obtain maximum benefit from this book by using it with professional guidance.

WILBERT PRONOVOST

Boston University

Author's Comment: Dr. Pronovost has stated cogently the intent of *Baby Talk*. The author thanks him for his favorable comments and hopes that other readers will agree with him. As he suggests, the book should be utilized in conjunction with a speech therapy program; it is not an adequate substitute for the speech clinician.

MORRIS VAL JONES

San Francisco, California

KANTNER, CLAUDE E., and WEST, ROBERT, *Phonetics* (rev. ed.). New York: Harper, 1960. Pp. 416. $6.

Kantner and West's *Phonetics* has an established place in the literature of general speech and the specialized area of speech and hearing. One would expect no less of the revised edition of this widely used textbook, and such expectations seem to be well-warranted. The revision is as sound and thoughtfully constructed as is the original; in fact, there are no major changes in point of view or general organization. The basic approach in the presentation and examination of the individual sounds remains the same as that used by the authors in the original edition—that is, the kinesiologic approach wherein the sounds of English are considered as modifications of the basic vowel sounds and are treated as manifestations of the movements involved in initiating and terminating the basic vowel sounds.

As the authors themselves point out, the most evident change in this edition is probably that of conforming to conventional phonetic symbolization. They now include in their chart of phonetic symbols the conventional diphthongs [ei, ai, ɔi, au, and ou]; they no longer use the symbols [j] and [w] to indicate the termination of these diphthongs. The authors have made these changes in the interest of consistency with the IPA and Kenyon and Knott's *Pronouncing Dictionary of American English*, but they have done so with considerable reluctance and with some 'misgivings.' They are quick to point out that 'conformity in symbolization does not . . . necessarily mean conformity in concepts and principles,' and that they have 'retained nearly all, and expanded some, of the differing points of view that characterized the first edition.' This change in symbolization necessitated major modification of the discussion of 'intervowel glides,' and the chapter on glides (Chapter 7) has been revised to a greater extent than any other portion of the book.

General discussion has been reduced and simplified in many instances, and the result is to enhance the book's value as an introductory text in phonetics, though it still leaves something to be desired as a most suitable choice for the introductory course enrolling general speech majors. The authors admit that it '. . . is aimed primarily at the speech correction trade,' and I would suggest that its use would be more appropriate to the specialist. Section I of the book, 'An Introduction to the Study of Phonetics,' is still one of the best discussions of this nature to be found. It certainly establishes a good rationale for the study of phonetics, defining 'basic considerations' and pointing out various approaches (acoustic, placement, kinesiologic) to the understanding of phonetic phenomena. The section in Chapter 2 dealing with 'Problems in the Study of Phonetics' is one that might very well be committed to memory by the beginning student of phonetics, since these are the problems that make the teaching and the learning of phonetics a sometimes painful process. The nine problems discussed in this section put the whole study of phonetics in proper context, and if the students can keep these problems in mind throughout the course, much confusion and misunderstanding may be avoided.

One notable omission in a book committed to a kinesiologic approach to the study of phonetics was the lack of any extensive reference to Stetson's *Motor Phonetics*. Also, a more extensive discussion of the nature of sound would have been desirable. A student trying to understand vowel theory or speech sounds as acoustic phenomena needs some basic grasp of the complex composition of sound. And I find it difficult to resist commenting on the seeming paradox of the

authors' declared intent 'to make the subject matter of phonetics more teachable' when they use terminology that might have precisely the opposite effect. Although the use of such terms as 'phonetic metamorphology,' 'phonemic etymology,' and 'diaphoneme' are perfectly justifiable in view of the rationale presented by the authors, it is doubtful if such usage simplifies the instruction of phonetic concepts.

The section on applied phonetics should be very helpful in relating theory to practice and in convincing the reluctant student of the necessity of a good grasp on phonetic principles if he is going to be engaged in speech instruction of any kind.

The book is well-illustrated, contains a selected bibliography, and has a large appendix filled with exercises, drills, and practice material. This revision is likely to find the wide acceptance and application that the original edition has, and for the same reasons —it is basically sound, comprehensive in treatment, and written in an original and consistent manner.

NED W. BOWLER

University of Colorado

Editor's Note: This review was sent to the authors but no comments were submitted.

LEWIS, RICHARD S., STRAUSS, ALFRED A., and LEHTINEN, LAURA E., *The Other Child* (2nd ed.). New York: Grune and Stratton, 1960. Pp. 148. $3.75.

Any person who has had to counsel with the parents of a brain-injured child will find this small book of 148 pages useful for himself and parents alike. The appeal of this book to professional persons as well as laymen lies in its informative yet highly readable content, stemming from an unusual combination of efforts. The late Dr. Alfred A. Strauss and Laura E. Lehtinen of the Cove Schools of Racine, Wisconsin, and Evanston, Illinois, collaborated with Richard S. Lewis, professional writer and parent of a brain-injured child, to produce this nontechnical yet informative book on a complex subject.

The aim of the authors is not to present a comprehensive, well-documented treatment of the brain-damaged child. Readers desiring this kind of information should turn to *Psychopathology and Education of the Brain-Injured Child*, Volume I, by Dr. Strauss and Miss Lehtinen, and Volume II, by Dr. Strauss and Professor Newell C. Kephart, and to the numerous publications of Dr. Strauss. According to the authors, 'the varieties of developmental deviations and the varieties of parental reactions are so manifold that this book reflects only the more conspicuous generalities.'

This book is intended to help the parents of the child with brain injury understand his 'otherness,' that he is a crippled child although his crippledness may not be visible. To this reviewer the authors succeed in clarifying the 'otherness' of the child with brain damage but give insufficient attention to the 'sameness.' The use of the label 'the other child' throughout the book further focuses the reader's attention on differences. However, perhaps this emphasis on the 'otherness' is essential to counteract the common tendency of most people to regard all the so-called misbehavior of the brain-injured child as willful or as the product of lack of training in the home.

The chapter headings—Perception, Conception, Language, Behavior, Management, Education—indicate the systematic presentation by the authors from the physiologic source, the damaged brain, to the behavior anomalies and management of the brain-injured child. The authors discuss how sensory data may be incorrectly selected, sorted and taken in, and erroneously evaluated; how apparent 'misbehavior' is based on these disturbed perceptions and conceptions; and how through the structuring of experiences the desired perceptions and conceptions are produced which lead to more predictable behavior.

The simplicity and clarity with which the ideas are expressed make this book worth having and sharing with all those interested in the brain-injured child.

MARGARET LOVE STOICHEFF

State University of Iowa

Editor's Note: This review was sent to the authors but no comments were submitted.

LILLY, JOHN C., *Man and Dolphin*. Garden City, N.Y.: Doubleday, 1961. Pp. 312. $4.95.

The author of this provocative little book, a neurophysiologist, presents an account of his research in dolphinology. Of particular interest to members of the Speech and Hearing profession are Dr. Lilly's theories and observations on the intellect and communicative behavior of these charming marine animals. These subjects are discussed in a pleasantly narrative style under such chapter headings

as: (a) The Possibilities of Interspecies Communication; (b) How Dolphins are Trained; (c) The Voices of the Dolphin and (d) Appendix 2: Intellect, Intelligence, Language, and the Brain.

Dr. Lilly predicts that within the next decade or two 'the human species will establish communication with other species: nonhuman, alien, possibly extraterrestrial, more probably marine; but definitely highly intelligent, perhaps even intellectual.'

One of the first steps in the efforts to establish 'intraspecies language' according to this authority, is to find a species whose brain is comparable in size and complexity to that of the human. The brain of the bottle-nosed dolphin (Tursiops truncatus) is about 1700 grams while ours is 1450 grams; and the relative brain weight per unit body length of the dolphin is about 200 grams per foot; ours is 240 grams per foot. Acquisition of preserved brain cells of several dolphins revealed the cell count of the thalami and cortex to be quite as dense as that of the human, i.e., the brain of Tursiops is a first-class brain, of the same order of complexity as ours (if not superior). Further there are more folds, fissures, sulci, and gyri in the dolphin cortex than in the human.

A 'kindly relationship' between man and the animal which is chosen to develop intraspecies comunication is apparently a requisite; such appears to be the case with dolphins who appear eager to learn from humans, have been known to warn humans of imminent danger, and according to reports dating as far back as Aristotle, some have evidenced passionate attachments for children as well as demonstrating gentleness and kindliness to members of their own species. Dr. Lilly, his family, and co-workers can vouch for the affectionate relationships that frequently develop between humans and dolphins, especially when dolphins are isolated from other dolphins, a condition which, incidentally, also facilitates learning. Punishment methods do not work as well in training these gentle animals as rewarding experiences. Impressive too, to this reviewer, are the frequent references to their excellent attention span.

One of the great difficulties encountered in studying 'dolphinese' is the fact that many of the sounds are emitted under water, although some animals did learn to accommodate by putting their blowholes out of the water to emit sounds. Since the dolphin apparently hears poorly in air, it was necessary to devise a technique of speaking to them under water which was accomplished with hydrophones, underwater loudspeakers, and other appropriate electronic apparatus.

In describing 'the voices of the dolphin' Dr. Lilly states: 'All of them (wild or captive) frequently creak, putt-putt, and whistle under water, with some rare quacks, squawks, and blats under water and in air. A few dolphins in captivity, in close contact with humans, can and do start producing more frequent airborne sounds on "request" . . . . . with care trainers can encourage the animals to "sing," i.e., emit sustained high or medium pitched "wailing" notes which change pitch smoothly or in staccato fashion.' A system similar to the 'visible speech' developed at the Bell Telephone Laboratories was resorted to to show the patterns of the sounds themselves.

Dolphins cannot only hear but can also transmit sounds which are supersonic for the human ear and it is possible that their physical conveyors of meaning may not overlap ours at all. Obviously some of the barriers to the establishment of communication with dolphins will be similar to those encountered in our efforts to provide speech for the deaf. Dolphins, like parakeets, articulate sounds at very high speeds although the rate may be somewhat slowed down when attempting to mimic humans. Examples of such mimicry, in the author's experience, included (a) human laughter with a high-pitched child's quality, after hearing a woman laugh; (b) human or electronically produced whistles, (c) Bronx cheers and other assorted 'impolite' (to humans) noises, and (d) human words: copied in extremely high-pitched and brief fashion, 'three-two-three'; [ti] [ar] [pi] for T. R. R., and a poor copy of 'It's six o'clock.'

The sounds produced by the dolphin may emerge from either the blowhole at the top of the head or through the open mouth in air. The blowhole contains a 'nasal tongue' and an anterior external lip. Farther inside the blowhole are two inner lips above two lower air sacs to control the opening during respiration and vocalization.

In the interest of comparisons a generous part of the appendix of the book is devoted to the anatomy and physiology of Tursiops truncatus and of special interest to readers of the *Journal* are the descriptions of the respiratory system and its relationship to the various sound producing structures. This material is well illustrated throughout.

If the author has explored the background of research in infant speech development and the standard methods for facilitating it, as presented in the literature in speech and hearing disorders, there is little evidence of this in his references or bibliography. Not-

withstanding, he appears to be proceeding along fairly sound principles and may, as he himself theorizes, accomplish his 'porpoises' better by avoiding the temptation to anthropomorphize when attempting to unravel the mysteries of dolphinese.

MARY HUBER

Los Angeles State College

Author's Comment: Thank you very much for your courtesy in sending me a copy of the review of my book *Man and Dolphin*. On Page 3 there is one minor correction; you say, 'The sounds produced by the dolphin may emerge from either the blowhole at the top of the head or through the open mouth in air.' In our experience in air, the sounds emerge from the open blowhole. Underwater the sounds emerge from the forepart of the head from the tissues themselves and they may or may not emerge from the open mouth underwater. In general, with *adult* dolphins, we do not see any air escaping during the vocalization process underwater; baby dolphins lose air through the blowhole while vocalizing under water.

In the last paragraph I am a bit puzzled by your statement 'the standard methods for facilitating infant speech'; are you referring to facilitation techniques with deaf children and in other cases of pathology, or with the normal child? If you can give me a reference to an authoritative review of these subjects, I would very much appreciate it.

We are very much interested in finding a professional specialist in this area to work with our animals in the research program. I would appreciate any help or information that you can give us along these lines. Thank you very much.

JOHN C. LILLY

Communication Research Institute of St. Thomas

MURPHY, ALBERT, and FITZSIMONS, RUTH M., *Stuttering and Personality Dynamics*. New York: Ronald Press, 1960. Pp. 506. $6.50.

Most experienced speech clinicians who specialize in working with stutterers recognize that a considerable share of their effectiveness as clinicians is not the result of attempting to modify directly the form of the stuttering block but is due, rather, to their role as a client-centered counsellor. The authors have expressed this idea in the following manner:

> *Many times the productive process in many forms of speech therapy are not those insisted upon by their proponents. They consist of unrecognized elements such as reconditioned social relationships, cathartic experiences, and the fact that probably anything which is said by the clinician has some degree of truth or helpfulness in it. There is a therapeutic effect on the stutterer by the sheer fact that a non-threatening and supportive adult is interested enough in him to set certain times aside for him to use as he wishes.*

Fundamentally, this book is an attempt to demonstrate how speech clinicians may more effectively utilize such 'unrecognized elements' in the treatment of stuttering through the mediums of individual and group play therapy, projective therapy and client-centered counseling. On the whole, it is a lucid demonstration. Every experienced speech clinician will undoubtedly find it profitable reading.

Particularly meritorious are the verbatim transcriptions of therapy sessions. To cite an example:

> *Stuart, a compulsively neat, seven-year-old gives a typical reaction to the finger-painting experience, saying: 'It feels funny-goo-goo-gooey. Look how nice it comes when I run my hand flat. (Laughter.) Hey, this is fun. Hey, let me get some brown. Look how nice it's coming, nice and thick. Ugh, gucky. I don't like that color. Nyuh. I'm going to put some orange in it. It's nice and smooth-smooth as ice cream. Look. (Running his finger tips around on the paper.) It looks like noodles. If you don't want it one way, you can change it, just rub it all with your hands. Look I'm using my arms. (Laughing.) Now, my elbows.' (More laughter.)*

Probably no knowledgeable person would deny that such an activity is an enjoyable and worthwhile one for any child, particularly if it is done in the presence of a permissive and interested adult. Probably, also, few speech clinicians would deny that such an activity is especially valuable for the child who stutters (whether primary, secondary, transient, or whatever) because it gives him an opportunity to speak his thoughts without the fear of being penalized for his repetitions and hesitancies. In this situation the child receives favorable attention for his speech. He expresses his ideas about his creations and is rewarded instead of punished. Speech production is associated with pleasantness rather than unpleasantness.

Many speech clinicians will, however, disagree with the authors about their interpretations of some of these activities. For example, in discussing the construction of a mobile by a nine-year-old stuttering boy, the following comment is made:

> *Though Keith's figure and that of his mother are clothed, Keith with his black crayons, placed a navel near the midsection of each body region, denoting rebellion against society, particularly his mother.*

Surely no universal agreement exists, even among the most traditionally minded students of Freudian theory, that a navel placed near the midsection of a fully clothed figure denotes rebellion against society. It would have been wise to explain more fully the reasons for such interpretations. Left as they are, such interpretations serve to create bewilderment, not only in the mind of the average speech clinician with her paucity of background in clinical psychology, but also in the mind of the more psychologically sophisticated reader.

Some speech correctionists will also disagree about certain other aspects of this book. For example, the statement that 'stuttering speech is a symptom of deep-seated personal difficulties' will undoubtedly call forth a chorus of dissent. But as one reads this book, a distinct impression is received that Murphy and Fitzsimons welcome such disagreement if only it will help the stutterer and his parents. A warmth, a sincerity, and an understanding of the problem of stuttering radiates from the writing. Despite its Freudian orthodoxy and its controversial statements, it is a valuable and practical contribution to the field of stuttering therapy.

WILLIAM TROTTER

Marquette University

Editor's Note: This review was sent to the authors but no comments were submitted.

OLIN, WILLIAM H., *Cleft Lip and Palate Rehabilitation.* Springfield, Ill.: Charles C. Thomas, 1960. Pp. 190. $9.

The purpose of this book is clinical and nondirectional in its professional address. It was written to '. . . aid others working with cleft lip and palate patients.' According to the author, the text represents an outgrowth of clinical experience in treatment of approximately 1200 cleft lip and palate patients.

As might be anticipated, the book contains many case reports which are illustrated by excellent photographs, drawings, and X-ray tracings. Although clinical in orientation, the book contributes more than an accounting of clinical techniques and experiences. For example, in the first chapter, the author has accumulated and organized considerable information pertaining to the incidence, embryology, and etiology of congenital clefts of the lip and palate. Descriptions and illustrations of variations in 'cleftness' are particularly valuable. The emphasis placed upon clinical recognition of significant variation is highly commended by the reviewer.

Surgical aspects of cleft palate rehabilitation are presented, and the reader is familiarized with some of the various surgical procedures. Speech specialists will be pleased particularly by the author's statement that '. . . speech is the criterion against which to evaluate the efficacy of physical management procedures.' The speech criteria, in conjunction with the descriptions of morphologic and physiologic variation in different types of cleftness, are well-chosen concepts to introduce the diagnostic considerations presented by the author. 'The width of the cleft, the quantity and quality of the tissues, the length of the soft palate tissues, the anatomy and dimensions of the nasopharynx, and the movements of the posterior and lateral walls are some of the factors to be considered.'

D. C. Spriestersbach's contribution to the book is one chapter entitled, 'The Oral Structures as a Speech Mechanism.' As opposed to Olin, Spriestersbach has directed his writing to one professional group. In fulfilling his stated purpose of orienting the dentist concerning speech production, the author describes the development of articulation skills, classification of speech sounds, and problems in production of speech sounds. Discussion of the effect of oral deviations upon speech is based upon clinical observation. As a recognized authority in the area, Spriestersbach's observations are respected.

The role of velopharyngeal closure in speech is discussed. Normal and abnormal closure are described and illustrated by X-ray tracings. Prosthesis is discussed as treatment for oral pressure problems. The point is well taken that '. . . improving the condition of the oral structure will usually not result in dramatic changes in speech since old habits need to be broken and new skills need to be learned.' The patient must view the changes which the dentist brings about as steps in the preparation for other changes

which, he, the patient, must bring about himself.

Dr. Olin's chapter on orthodontia presents a philosophy of cleft palate treatment which shows his understanding of cleft palate problems. The need for longitudinal surveillance is emphasized. Early treatment at three to four years of age is recommended in *some* cleft conditions: to facilitate a full expression of the growth potential, to improve oral and periodontal health, to encourage normal tongue posture and function, and to simplify orthodontic treatment of the permanent dentition at a later stage of development. Orthodontic appliances and various treatment procedures are described and illustrated. Sixteen orthodontic case reports are included in the chapter.

The chapter entitled 'Cleft Palate Prosthesis' presents the value of prosthesis from an esthetic, psychological, and functional standpoint. Problems encountered in construction of prosthesis for the young cleft palate patient with deciduous and mixed dentition are described as well as those encountered in the prosthetic treatment for the adult patient. The discussion of prosthesis has particular merit for the speech specialist because it is not limited in scope to obturating function. The statement, 'Most cleft lip and palate patients will require a prosthesis which will vary with the severity of the deformity,' introduces many aspects of prosthetic and pedodontic dentistry, nebulous to the speech scholar. Replacement of missing dental units, space maintaining devices, impression techniques, problems in retention, restoration of vertical dimension, provision for palatal perforations, combined orthodontic and prosthetic treatment, construction and placement of the pharyngeal bulb of the obturator, are some of the areas discussed by the author. Although the speech clinician cannot be expected to understand the technical aspects of prosthetic construction, it would appear that he should be informed in the principles involved and aware of what the dental specialist can provide in meeting the needs of the cleft palate patient. To determine whether an obturator is adequate for normal speech, the author recommends the use of cephalometric X-ray, oral manometer testing, and a thorough speech evaluation.

For much too long a time, the question of surgical versus prosthetic treatment of cleft palate patients has been in the foreground of rehabilitation discussion. Most serious students in the area of cleft palate realize that it is not a question of which type of treatment is preferred, but rather a question of defining differentials in criteria applied to determine which technique will best fulfill the longitudinal needs of the individual patient. Dr. Olin does not make this point nor does he discuss criterion. This is not criticism; on the contrary, the author is to be respected for his abstinence in entering an area of critical importance and interest but one basically lacking in the type of information required. There are several statements made by Olin which indirectly relate to the general area and merit repetition. 'The decision for proper management should be made by all individuals concerned. . . . There are some types of clefts of the palate which will result in more satisfactory speech if treated with an obturator.' Unfortunately the phrase 'types of clefts' requires greater definition than can be offered at the present time.

JOANNE SUBTELNY

Eastman Dental Dispensary

Author's Comment: Thank you for sending me a copy of the review of my book prepared by Dr. Joanne Subtelny. I was very pleased with the entire review and with the comments Dr. Subtelny made. I have no comments to make.

WILLIAM H. OLIN

State University of Iowa

STANLEY-JONES, D., and STANLEY-JONES, K., *The Kybernetics of Natural Systems*. New York: Pergamon Press, 1960. Pp. 137. $6.50.

The authors of this book are audacious, for, possessed with good reasoning powers, a fair amount of information, and a deficiency in mathematics, they apparently hope to show how to go about answering some important questions in biology. This is an instance of the high school pupil telling a university professor in the physical sciences what the story is, and while in principle the pupil could inspire the professor, it is most unlikely. The professor, who does know mathematics, and therefore at least stands a chance of putting his perhaps similar but higher level theories to precise formulation, has been at work on the same questions for years. This is not to say there cannot be good nonmathematical popular science writing; it is only that by attempting to show scientists a 'new' science, the authors have overreached themselves. Their work

amounts to a good journalistic effort and may be read at that level with profit. (It is only just to add that, not better endowed than the authors, the reviewer is himself now being audacious. He is, by the way, grateful to two better endowed expert colleagues for also having read the book and offering insights.)

What is kybernetics? On page xi it is the 'science of government of living structures,' and on page 130 it is 'a science which treats of patterns of control, whether of living or nonliving systems.' The concepts of negative and positive feedback, stability, oscillation, and runaway are the 'equipment' furnished to analyze the problems of control. Negative feedback leads to stability and biological well-being; positive feedback leads to runaway either to maximum or to zero, both biologically disastrous. Numerous examples taken principally from invertebrate and vertebrate biology are given to illustrate the power of these concepts.

Unfortunately, we may fairly easily be led to wonder whether certain particularizations hold water. We may, for example, examine the analysis of the 'balanced antagonism' of the orthosympathetic system and sympathetic systems. The authors contend that the orthosympathetic system is a positive feedback system which would runaway were it not for the negative feedback controlling power of the parasympathetic system. They categorically attribute sphincter closure to the orthosympathetic system, which in a fear situation, dominates the parasympathetic system.

But if this is so, how are we going to account for the incontinence of soldiers on the battlefield or of the case attested to me on good authority that a ballerina regularly danced on the stage in wet pants? It is perhaps not sound to try to counter the authors' analysis with clinical evidence, but some of the evidence they present is on the same level.

The imprecision evident in the pair of definitions pervades the book. Here are some examples of unnecessary or overoptimistic exaggerations which, although they are unimportant because they are not substantive, should make general semanticists and zennists wince: 'The simplest experiment in human physiology is the testing of the knee jerk.' 'On a neural level, the simplest concept is the reflex.' 'The study of the pattern of refectory controls in a living organism can throw a new light upon the hitherto unsuspected physiological principles of its working.' (The 'more elegant' paraphrase 'refection' is favored over 'feedback.')

Here are examples showing how the authors' lack of sophistication causes them to be wrong, trivial, or to miss an opportunity to be instructive: The bat is held to operate on a 'vastly more intricate scale' than the dogfish because it is sensitive to 60 kc compared to the dogfish's 6 cps. Amplitude modulation in the nervous system is ruled out and only frequency modulation is admitted. That the jellyfish can survive the cutting away of seven of its eight otoliths is attributed to an eight-fold multiplication of nervous energy from the survivor—no indication is given that an 'or' logic could do the job.

The authors' attempt to make their analysis embrace all systems represents a serious philosophical shortcoming, for they do not distinguish between description and design. An engineer attempting to design a system presumably knows its purpose; a scientist confronted with an extant natural system cannot simply state the system's purpose—the system merely is. If he can, the scientist may define a purpose, but his analysis of the system as a closed or open loop in some cases is arbitrary. Stated in another way, the scientist, once he has found the differential equations describing his system, does not need to find meaning in terms of feedback loops. The designer, on the other hand, may find it useful to set up his equations from feedback considerations.

Is speech discussed in the book? No. However, the reviewer notes that application of control concepts to speech in recent years preceded publication of the book. None of the analyses of which he is aware proceeds explicitly along lines of stability and runaway, though he imagines it is easy to associate fluency with the former and, say, stuttering, with the latter. The difficulty in theorizing lies, he supposes, in making the control concepts nonempty. What good is it to speak of *comparators, effectors, fluency error signals,* etc., when we have no idea of how to specify time constants, degree of coupling, nature of error signal, etc.?

To elaborate further on error signals: speech control system theoreticians seem to find it necessary to postulate as the forward driving signal an error signal which is derived in the manner of linear closed-loop systems from the difference between input and output. (In what sense could /o/ be subtracted from /i/?) To plug the loophole which is created in any closed system by

transmission delays, they assume the existence of a predicted error signal.

In this kind of formulation, the output tracks the input by means which reduce the error (difference) signal to zero. It should be noted that this is not the only way, that tracking can be accomplished without the use of error signals in the foregoing sense. To illustrate, suppose one wants to track an airplane with radar. It may be more efficient to incorporate a differencing system, but in principle it is possible to follow the plane by continually measuring its location and using the coordinate signals to drive precalibrated radar tracking motors. One may feel intuitively that this 'open-loop control' resembles the speech control system more closely, for we can think of infant learning of speech as 'calibration,' and speech improvement as 'recalibration.' Furthermore, auditory and somesthetic feedbacks at ordinary speaking rates serve not as short-term, directly coupled inputs into the motor system but as large-sense means of calibration maintenance.

In view of the reviewer's opening analogy, it is an irony that Professor Norbert Wiener, who when he revived the term probably should have spelled it with a *k*, considers the book 'great' and 'destined to occupy a classical place.' Well, the reviewer has beaten Professor Wiener two out of two at chess, and perhaps the professor in the game of preface writing is out of his milieu again.

NEWMAN GUTTMAN

Bell Telephone Laboratories

Author's Comment: Kybernetics is the meetingplace of many disciplines. Yet if it is to emerge from its present almost exclusive preoccupation with man-made, artificial systems (machines), it is essential that mathematicians should contrive not only to speak in nonmathematical language, but also to know a little of the natural (physiological) systems to which kybernetics equally well applies. If this meeting of the physical and biological sciences is to be fruitful, it behooves each side to share their knowledge, and to express it in simple terms, rather than to decry the presentation of new ideas for no other reason than that they are new. The advance of science is ill served by a mathematician (such as your reviewer) without knowledge of physiology, who airs his frivolous and irresponsible views on the work of physiologists who (it is incorrectly alleged) are without knowledge of mathematics.

To join the theories of kybernetics to the science of physiology has been the purpose of our book. It is, first and foremost, an application of kybernetics to *natural*, physiological systems, in contrast with the electronic devices of the engineer. We have not introduced the technical jargon of mathematics because our book is addressed to nonmathematical, medical readers. In spite of this self-imposed limitation, Professor Norbert Wiener has referred to our work as 'particularly important, because it goes so far beyond an elementary account of those linear feedback systems in which the correction of an error of performance is numerically proportional to that error itself.' He also writes: 'For the complete accomplishment of his task, Mr. Stanley-Jones is forced to go far beyond the study of linear feedback and to examine nonlinear processes of considerable complexity. I am in full agreement with him that the study of these processes is of the greatest importance for the understanding of controlled processes in the living organism. . . . The book fills, and fills well, a place which no other book occupies. That its implications lead far beyond its own methodology is a comment, not a criticism, and it is a comment which can be made on all great works of science, not excluding Darwin's *Origin of Species* and Newton's *Principia*.'

The theme of balanced antagonism between the opposing moieties of the autonomic is at least 40 years old, and is now incorporated in elementary textbooks at medical student level. Equally well-established is the fact of frequency-modulation in the nervous system, and the orthosympathetic closure of the sphincters. Your reviewer cites the clinical evidence of incontinence of urine in a professional dancer: this is not infrequent, it is an anatomical weakness of the sphincter occasioned by the training exercises, and is of no physiological or emotional significance.

We have developed more fully elsewhere (*3*) the functional contrast, or cooperative antagonism, between the two halves of the autonomic system, and the relation on the one hand between the orthosympathetic and the emotions of rage, hate, fear, and anxiety, and on the other hand between the parasympathetic and lust (libido), love and its sublimations, including creative thought. The contrast at the physiological level between rage and lust, hate and love, may perhaps have its counterpart in a hitherto unexplained relation among three patterns or manners of speaking. Some speakers, typified by Luther and Hitler, can unlock the floods of oratory

only under the dominance of an orthosympathetic emotion, they have to 'work themselves up' almost to a frenzy. Others are rendered mute by any untoward situation, which arouses their reactions of defense. These two modes of speaking, it is believed, are under the influence of the orthosympathetic and its reaction of fight-or-flight, whose pattern is that of positive or self-exciting feedback, resulting in a runaway to maximum or zero. Thinking, speaking, and writing on the creative level, on the other hand, are explained in terms of negative or stabilizing feedback: the psychoanalyst names it a sublimation of libido or lust; the physiologist believes that the higher ranges of thought have their neural substrate in the prefrontal areas, under the influence of the anterior hypothalamus and the parasympathetic, and related to the orbital cortex (Area 13) which is the projection area of the vagus.

Kybernetics may perhaps make its contribution to the understanding of disorders of speech. On the simplest level of the muscular control of voice production, a close analogy may be drawn between the tremor of a singer's voice and the muscular tremors of a human disease. It is assumed that the vocal tremor is an undesired instability, and not a consciously designed affectation. The large muscles of the body maintain their steady state, because of a feedback system which operates through the muscle spindles. The muscle spindle signals back, to the motor centres of the spinal cord, information concerning error or distance-from-goal. On receipt of this information, the motor cells adjust their output to reduce that error to zero. If there should be a delay, however, in the transmission of feedback signals, the muscle in correcting its position may overshoot its mark; the muscle spindles then feed back information of the new error, in the opposite direction, and the motor cells react accordingly. The muscle again overshoots, and the cycle is repeated. The tremor in the muscle, which in these circumstances replaces the steady state that is desired, is due solely to delay in arrival of the correcting feedback.

It is doubtful whether muscle spindles play any role in the maintenance of the steady state of the laryngeal muscles. The correcting feedback, or information about error as distance-from-goal, comes from the auditory centres in the cortex. Hence it is that deaf persons find it difficult, if not impossible, to sing without a tremor in the voice, because they have lost the monitoring feedback that is essential for the maintenance of the steady state.

Neurologists have long been searching for an explanation of tremor. Many theories have been put forward, none of them wholly convincing. Kybernetics has been able to make its contribution to this and to certain related problems of neuromuscular control (*1*). A kybernetic explanation, in some detail, has been put forward for coal miners' nystagmus, and for the oculogyric crises of encephalitis, neither of which has yielded to analysis on purely physiological lines (*2*).

Time alone will tell which of these approaches (that of physiological kybernetics, or with mechanical similes such as comparators, effectors, fluency error signals, and the like) will prove to be the more fruitful. In the present rapidly advancing state of our knowledge, it would be unwise to neglect the possibilities of either.

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D. Stanley-Jones
Hayle, Cornwall, England

Victoreen, John A., *Hearing Enhancement*. Springfield, Ill.: Charles C. Thomas, 1960. Pp. 183. $7.50.

This book deals primarily with information which the author considers as part of the science of 'otometry.' 'Otometry,' states the author, 'covers both the measurement of residual hearing and its enhancement. One skilled in this science should be capable of prescribing a hearing instrument most suitable for use with a particular deafened ear. This is the realm of the qualified instrument dispenser, and is the basis upon which hearing instruments are properly prescribed and fitted.'

The author makes clear the objectives of the book in these statements: 'This book has been written for the many otologists, audiologists, and hearing aid dispensers and their assistants who have need for a simple, understandable handbook on the subject.' 'It is an elementary textbook for anyone interested in the evaluation of hearing loss and residual

hearing.' 'It is the intention to present here the fundamental principles of acoustics and physics as they apply to hearing enhancement in the simplest possible terms, while carefully preserving scientific accuracy.'

Although *Hearing Enhancement* is a relatively short book it contains 26 chapters, each one very brief. A chapter-by-chapter evaluation is therefore not feasible here. The following chapter titles will, however, provide a limited description of the book's contents. 1. Otometry. 2. The Ear. 3. Hearing With Two Ears. 4. Psychological Considerations. 5. Decibels. 6. Pure Tone Threshold Audiometers. 7. Otometric Measurements Using a Decibel Meter. 8. Decibels Per Octave. 9. Free Field Pressures and Ear Canal Pressures. 10. Usable Free Field Sound Pressures. 11. Useful Free Field Hearing Area. 12. Loudness. 13. The Nature of Sound Pressures. 14. The Nature of Speech and Speech Sounds. 15. Principles of Acoustic Amplifiers. 16. Distortion and Sound Pressure Cycles. 17. Prescriptions and Hearing Instruments. 18. The Hearing Range. 19. Sound Pressure Cycles and Gain. 20. Sound Pressure Cycles and Frequency. 21. Hearing Loss and Sound Pressure. 22. Best Audible Pressures. 23. Direct Current Electricity. 24. Alternating Current Electricity. 25. Sound Pressure Generation. 26. Sound Pressure Limitation.

The author, in describing a procedure for 'Prescription Fitting' of hearing aids, indicates that pure-tone threshold audiometers and speech audiometers are not suitable for the measurements needed. He suggests an instrument, the Decibel Meter, for this purpose. The 'Decibel Meter' is an acoustic amplifier which is calibrated in db re .0002 dynes/cm^2 at 1000 cps. It has a frequency range similar to practical hearing instruments and an adjustable frequency response specified in db per octave.

The author states, 'There is always a series of pressures which vary with frequency and which provide the best audibility for a particular ear.' These 'Best Audible Pressures' are utilized in selecting the particular instrument to be fitted. The 'Best Audible Pressures' for each frequency, for the normal ear, are found to be about halfway between minimum audible pressure and maximum tolerable pressure.

It is not the intent of this reviewer to analyze the particular fitting procedure suggested. However, the student of audiology would expect the author to relate his suggestions to research findings in this area as well as to data from his own laboratories. He does not adequately describe his own laboratory experimentation and he does not support his philosophy with other research data. Comparison of the suggested procedures with other evaluation procedures might also be expected. These omissions appear serious when presented in a book intended as a text and when many of the intended readers now utilize procedures which differ considerably from those presented.

The content of this book ranges from highly complex material which is not adequately explained to presentations which are extremely oversimplified. Discussions concerning many of the topics are far too incomplete. It is the feeling of this reviewer that some of the topics considered and statements made should either have been omitted or explained more completely. For example, Chapters 2 and 3, concerning the anatomy of the ear and the nature of speech sounds, are so oversimplified and so incomplete that it is questionable whether they would be useful for the intended readers of the book.

Occasionally, relatively unimportant material (for the stated purposes of the book) is given an undue amount of attention. There appears to be little useful purpose for most of the material presented in Chapter 11, 'Useful Free Field Hearing Area.' The following quotation illustrates the subject to which this chapter is devoted:

> *It may be observed from the circles in the diagram shown in Fig. 11.1 that a loss of only 20 db reduces the hearing area from normal of 3,140,000 square feet to only 314,000 square feet, which is a reduction of 90% and a residual area of only 10% of normal. A hearing loss of 40 db reduces the hearing area to 31,400 square feet, which leaves a residual hearing area of only 1% of normal. . . . It is obvious that even a relatively small hearing loss has a profound effect upon the usable hearing area.*

The organization of the book creates difficulty in understanding some of the author's terms which are used throughout the early part of the book, but not thoroughly explained until later chapters.

Some of the terminology itself is new and perhaps more cumbersome than necessary. The objective of unifying terminology in related fields is highly laudable. Reasons should be given, however, to show how any new terminology presented may be superior to that which has been in use by workers in the field for many years. This is not done.

In the opinion of this reviewer, the book does not satisfactorily achieve the author's

stated objectives. Potential readers who have not had a previous introduction to this area will fail to gain a clear understanding of most of the material covered and those readers who have had previous training and experience will not be satisfied with the incomplete coverage of many topics, the lack of adequate explanation of the author's own research, and the lack of comparative evaluation of the author's data with other research. It should be pointed out that the author cautions that the book '. . . does not provide detailed treatment of the subject' and that '. . . much has been intentionally omitted on the theory that if a few basic fundamentals can be made intelligible and interesting to those who need them, those who wish details will be thereby persuaded to pursue them elsewhere.' This statement may provide an explanation for the incompleteness and superficial nature of the treatment in much of the book; but it does not help the reader who must have sufficient detail to understand topics which are really quite complex; nor does it satisfy the more sophisticated reader who will expect more adequate coverage.

Although some material of value may be gleaned from the book, this reviewer cannot recommend its use for the purposes intended by its author. Certain parts of the book may possibly have limited use for supplemental reading assignments when accompanied by classroom discussion and explanation.

ERNEST J. BURGI
University of Nebraska

Author's Comment: The book *Hearing Enhancement* is a compilation of 26 chapters, each of which was originally issued as a separate article. One of these has been issued every month since November 1958 and they are still being issued. They have been sent to many hundreds of otologists, audiologists, hearing instrument dispensers, and their collaborators. The format, scope, and depth of these articles have evolved experimentally over a three-year period as a result of the many conscientious suggestions which were received.

The book is not intended individually for otologists or for audiologists or for hearing instrument dispensers. It is intended to provide a common interest for all which obviously is, and must be, very limited as to the kind of material included. The material presented is intended to express prosthetic requirements.

Many divergences of opinion exist between some otologists, audiologists, and hearing instrument dispensers. These are truly conscientious differences and beliefs which exist due to lack of understanding of each other's problems. The author is well aware of these and has tried sincerely to provide some reconciliation.

The sophisticated reader will consider the material presented in *Hearing Enhancement* inadequately covered. The unsophisticated reader will consider it too complex. This is, perhaps, the essence of compromise which the author has hoped to achieve.

The book deals with prosthetic hearing enhancement. It places the hearing instrument dispenser in the position of a prostheticist, with his own field of knowledge, and attempts to supply some of the information required.

The conscientious hearing instrument dispenser now operates in a professional vacuum. He is forced into a 'commercial' category often by the misguided professional belief that he can be nothing more. Both he and his product need enlightened understanding.

Hearing instruments can be prescribed for prosthetic purposes by simple, acceptable, common sense principles which can be learned in a short time by anyone. Nothing really new is involved. The author merely attempts to organize the basic laws of physics and acoustics which apply and present them in an accurate but popular way.

Those engaged in the field of speech and hearing disorders should find the book useful. It describes the objectives of prosthetic hearing enhancement and how these may be fulfilled by a prescription quality hearing instrument and a reasonably qualified dispenser.

Confusion may be expected to arise over the definition of the field or subject covered by this book. It certainly is not audiology or otology. The author suggests that the subject matter refers to the separate and emerging field of 'otometry' for it is intended to be confined to the prosthetic requirements of hearing enhancement. It does not treat the subject comprehensively. Derivations and complex bibliographies have been found to frighten and further discourage those who need a limited but working knowledge of the subject.

The desirability of publishing the material presented in *Hearing Enhancement* and the method of presenting it has already been well established as suitable for its intended purpose during the three-year period before its final publication.

JOHN A. VICTOREEN
Colorado Victoreen Laboratory

WRIGHT, BEATRICE A., *Physical Disability—A Psychological Approach*. New York: Harper, 1960. Pp. 408. $6.

The author is well qualified by training and experience for this ambitious and thorough treatment of a difficult subject. Dr. Beatrice A. Wright, a clinical psychologist, is recognized for her contributions in adjustment to disability, parent counseling, and child psychology. She possesses a unique skill in being able to present a difficult subject with clarity and understanding. The casual reader may be concerned about so many of her theories, observations, and recommendations in this publication seeming to have as their base the personal stories of those with disabilities as written by Louise Baker, Russell Criddle, Earl Miers, Karen Ohnstead, Henry Viscardi, and others. However, the careful reader will find that the author has skillfully blended various psychological theories and concepts with the limited research data as they relate to case presentations and theoretical concepts of disability. The author states in the preface, 'Certainly not all the assertions made have scientific validity. But it is hoped many of them are supported by sound psychological thinking and by research evidence where possible. In any case all of them are advanced until further notice.'

After 'Circumscribing the Problem' the author tries to help us see the individual with a disability through his 'Inferior Status Position,' 'Salutary Status Position,' 'Frustration and Uncertainty,' 'Value Changes in Acceptance of Disability,' 'Development of the Self-Concept,' 'Self-Concept and the Perception of Interpersonal Relationships.' She gives special consideration to 'The Adolescent with a Physical Disability' since she says this is a period when 'the self-concept undergoes important changes' and the adolescent becomes a member of a minority group as he overlaps adulthood and childhood. The adolescent has to cope with this transitional stage as well as with the disability.

From the chapter relating to the adolescent she goes on to 'Grievances and Gratifications in Everyday Relationships' and 'Sources of Attitudes Toward Persons with Atypical Physique.' In these chapters she emphasizes the need of further research in order to 'shed further light on the balance between "hope" and "fact."' In the last five chapters the author relates to 'Training in Social Skills,' 'The Parent as a Key Participant,' special attention to 'Motivating Children in the Rehabilitation Program,' 'The Client as Co-manager in His Rehabilitation,' and lastly 'An Assessment of the Field of Somatopsychology.'

The author stresses not only the implications of a disability but also what the individual does to himself because of the disability and what society does to him because of the disability. In getting the person with a disability ready to take his rightful place in society, it is necessary that he accept his disability. The author states, 'Emphasis is on the kinds of social-psychological situations that confront a person with an atypical physique, and how he copes with them. Factors within the person and factors attributable to the environment are considered in terms of how they aid psychological adjustments or, on the negative side, how they create difficulties.'

Dr. Wright explains in the preface that, 'This volume was written for the practitioner in the field of rehabilitation, especially for the professional in training, though I would like to believe that the research worker will also find some leads for productive exploration.' She then goes on to explain that the practitioner covers such a wide range of professions that it also should include the patient and his family. Technical language has been omitted in order to assist in the process of communication. While most of the references to disability are to the blind, deaf, and physically handicapped, the observations and recommendations would be equally applicable to those with speech disorders and hearing impairments. This is a book which all who relate to patient care and treatment should read. It would serve as an excellent textbook for bringing together students in medicine, psychology, associated health professions, and special education for consideration of psychological questions pertaining to disability. The book will not answer specific questions on what to do about a specific individual with a disability but will provide for the clinician and teacher a frame of reference upon which to base judgments and decisions.

DARREL J. MASE
University of Florida

Author's Comment: I want to take this opportunity to express my appreciation of the policy of the *Journal of Speech and Hearing Disorders* which allows authors, nay encourages them, to add clarifying remarks to a review.

Two projects in which I had participated laid the basis for the theoretical approach of

Physical Disability—A Psychological Approach. The first was a critical review of the literature, undertaken with Roger G. Barker et al. and bearing the title *Adjustment to Physical Handicap and Illness*. The second was a research investigation carried out with Tamara Dembo and her associates, now known as *Adjustment to Misfortune*. Both of these made me so aware of the plethora of myths which stand for facts concerning the relations between physique and behavior that an important function of the present book is to expose the myths that interfere with rehabilitation practice and with the scientific approach to resolving issues.

To clarify problems of disability, the book draws heavily upon concepts and findings belonging to the field of psychology in general. At the same time, experiments and observation dealing directly with disablement have yielded new knowledge of such basic importance to general psychology that the field of disability is increasingly commanding the attention of research psychologists.

BEATRICE A. WRIGHT
University of Kansas

Coming in the February Journal

1. 'Stuttering and Social Structure in Two Pacific Societies,' by Edwin M. Lemert.
2. 'Revised CNC Lists for Auditory Tests' by Gordon E. Peterson and Ilse Lehiste.
3. 'Experienced and Inexperienced Articulation Examiners' by Gerald M. Siegel.
4. 'Rationale for Group Treatment of Aphasia Patients' by Lois Masket Bloom.
5. 'Measuring the Performance of Group Hearing Aids' by Kirti K. Charan.
6. 'Effects of Various Durations of Speech Improvement upon Articulation and Reading' by Ronald K. Sommers and others.
7. 'Two methods of Presenting Information on Speech and Language Development' by R. Ray Battin.
8. 'Passage for Speech Screening in Upper Elementary Grades' by Velma Avant and Charles Hutton.

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